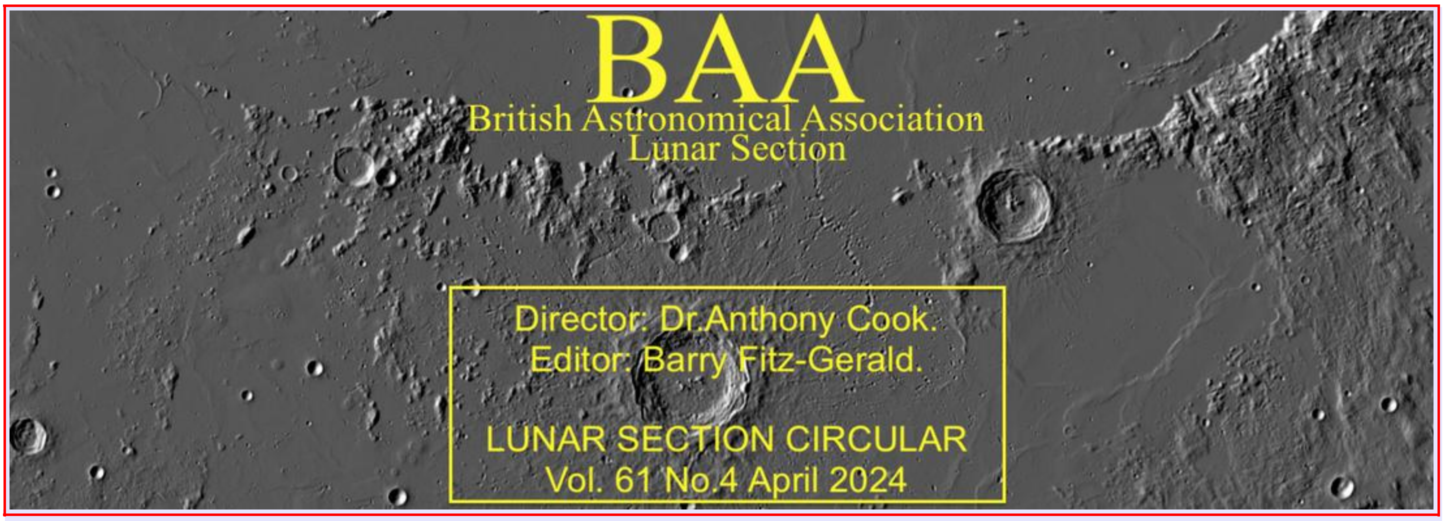
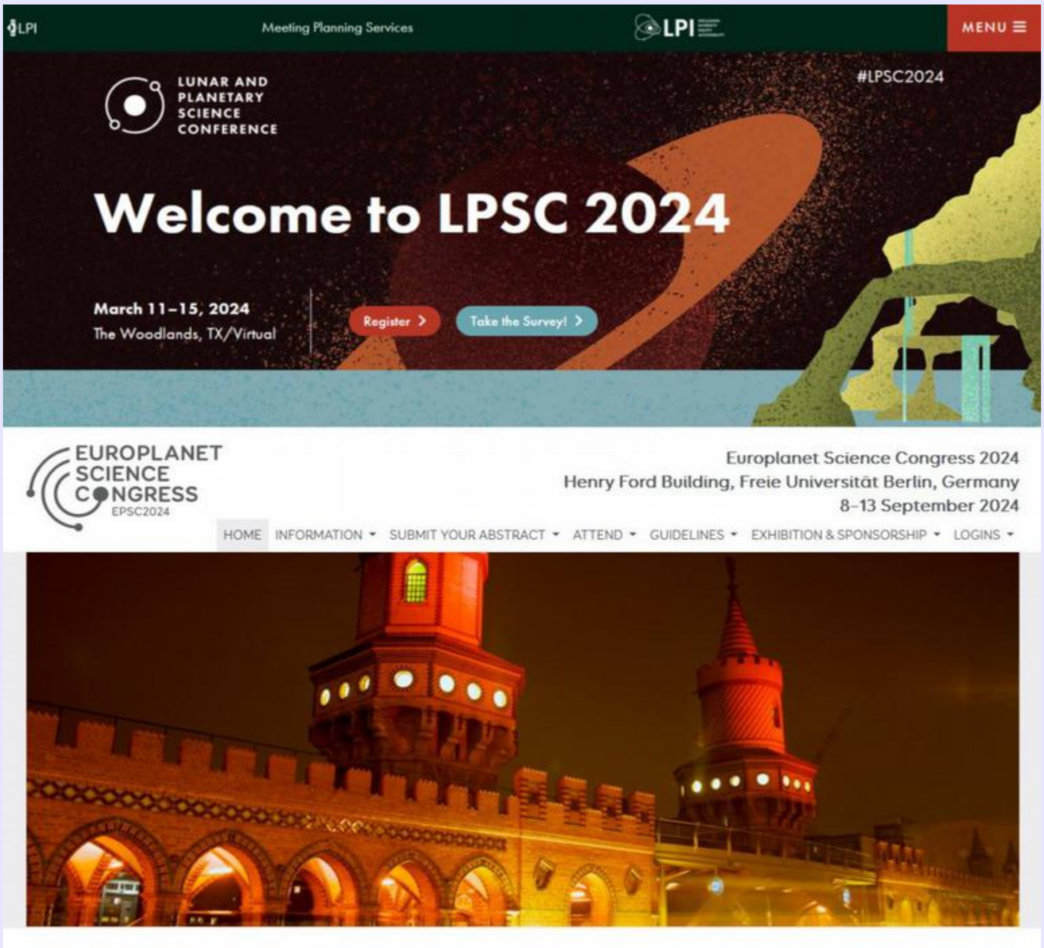



## From the Director




Every year in early March, and early September major planetary science conferences are held, the Lunar and Planetary Science Conference (LPSC) in The Woodlands, Texas, USA, and (usually) in Europe the European Planetary Science Congress (EPSC). If you want to see the fruits of the latest research, before it makes it into high-brow research journal papers, then these are the places to be for professional lunar scientists. However, even if you are an amateur astronomer, do not be put off as you can still view summaries of the material presented in the LPSC conference programme, just click on a session that interests you and you will see all the lectures and posters – clicking on these will reveal the two page abstract PDFs. For the EPSC Conference program the rules are more lax and authors end up submitting a web page – note that I have used a past conference here as the 2024 abstracts have not appeared yet as the abstract deadline is in May. Some talks are streamed live over the Internet, or recorded for later viewing, it really all depends upon what the conference organizers decide.

When I worked as a planetary researcher in the US, Germany, and later the in UK, I would often attend these conferences and my favourite was LPSC which was originally held at the Johnson Space Flight Center at Houston Texas, but subsequently moved to League City and then to the Woodlands (all in the vicinity of Houston). It had to move to different locations as the numbers attending the conference ballooned in size. This year's LPSC is the 52$^{nd}$, since the Apollo era. At an LPSC typically there would be many sessions running in parallel which made it impossible to attend every lecture and so you had to be very selective. Fortunately the sessions were split into themes, so I would normally stick to lunar, or planetary mapping, themes. The lectures were usually limited to about 8 minutes and 2 minutes for questions, though this varied and were quite formal. Nevertheless things very occasionally got quite heated, for example a world leading German crater counting (planetary surface age estimation) expert, Prof Gerhard Neukum jumped up on stage once, interrupting and taking over another lecturer, simply because he disagreed with him, at least until the chairperson regained control. I also remember after an early talk on the lunar ice at the poles, shortly after the Clementine Bistatic Radar results hinted at ice, I overhead a well-known lunar scientist talking rather loudly outside the lecture room, that the previous lecturer was wasting their time looking for ice, as the Moon was completely dry. How things have changed, though of course the water content is still very low compared to rocks on Earth, except perhaps at the poles! The most fun part of all was during the poster session where people stand and drink beer and eat crisps/chips, discussing what they had on display on their posters. A famous professor from Brown University would always reprimand his PhD students if they wandered off from their poster as you never knew which famous planetary scientist was about to walk past and want a chat with the author. Being in Houston astronauts probably also were wandering around too but they tended to be incognito. There was so much interest and enthusiasm, that at the end of the poster session the organizers had to switch the lights on and off to try to get delegates to leave.

Unfortunately the cost of the LPSC conference fee has risen sharply, which is one of the reasons I stopped going. EPSC in Europe started off cheaper (especially if you join the European Planetary Society), and the good news is that if you apply as an amateur astronomer you can get in for just a few tens of euros and are not confined to the amateur astronomy session but can go to the more hard core science lectures. I have met quite a few BAA observers at EPSC meetings.

So yes if you have time, take a look at the lunar abstracts from LPSC on the LPSC conference programme, don't expect to understand everything – usually the introductions and conclusions are less technical and some of the diagrams and images can be quite enlightening. Then later in the year try out the EPSC Conference programme as they are still taking in abstracts with a cut off deadline of 24$^{th}$ May.

**Tony Cook**

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**Obituary.**
**By Tony Cook.**

## Marie Cook (1931-2024)


Marie Cook in Devon in the 1950's

Marie was born in 1931 in Lambeth, South London. Growing up during World War II she and her mother were bombed out of their house and their cat was blown throw the wall by the explosion, but survived, albeit behaving a bit differently afterwards. Prior to, and during the war, she took an interest in ballet and was involved in ENSA, entertaining troops. Later she met her future husband, Jeremy Cook through a church club and they married in the mid 1950's. One of the key people at the church club was Collin Ronan, the amateur astronomer and author, who they would later meet again at the BAA and who would eventually become the BAA's president. Their son, Tony, was born in the early 1960's. Astronomy interests developed when the family lived in Frimley, Surrey. Marie had written off to Sir Patrick Moore and he invited the family all down to visit him in Selsey and thence recruited us into the BAA and it's Lunar Section.

Marie was an excellent astronomer, specializing in TLP work and sketching the Moon for the New Moon publication; she even wrote a paper (J. Br. Astron. Assoc. 110, 3, 2000 p117-123) and would later become a member of the BAA council. The paper: "The Strange Behaviour of Torricelli B" was about a previously un-noteworthy crater that on 1983 Jan 29, one day after Full Moon, and at an extremely close lunar perigee, for a short time became considerably brighter than any other crater on the Moon, before fading but exhibiting a strong violet colour. The extreme brightness was witnessed by two observers, and the strong blue or violet tint, appearing later, was seen by many observers. Despite repeated repeat illumination and repeat topocentric libration observations, nothing quite like this extreme brilliance has ever been seen again at this feature.

Marie and Jeremy became involved in the council of the Reading Astronomical Society for many years. Another hobby of Marie and Jeremy was genealogy and this was perhaps a main reason why they both moved to Mundesley, Norfolk in the early 'noughties' to continue work looking into the Cook family tree, as the ancestors of the Cook family came from Norfolk. Alas Jeremy passed away shortly after they moved to Mundesley and Marie soldiered on for about twenty years. In April 2022 she was taken into hospital with Hiatal Hernia and Pneumonia, and although she fought off the latter, was in and out of care homes and hospital until her passing at the end of February. She will be greatly missed by her son, daughter-in-law, grandchildren, family and friends. Hopefully she has now met up with her husband, Jeremy and is keeping him informed on the progress of the family and friends, and astronomy back down here on Terra Firma.

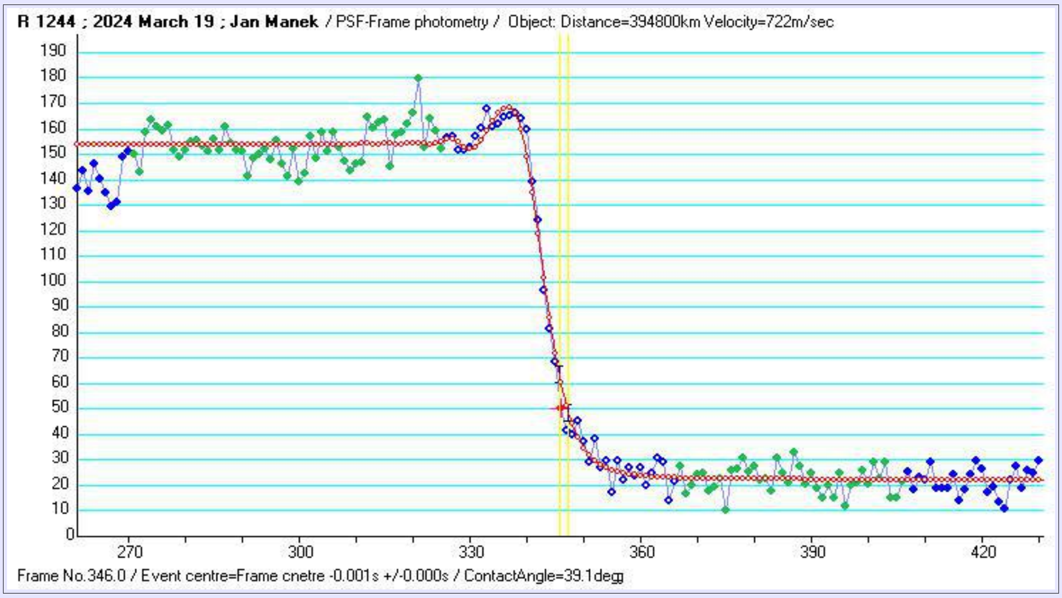
**Lunar Occultations April 2024 by Tim Haymes**
**Time capsule: 50 year ago: in Vol 9 No.4**

[With thanks to *Stuart Morris* for the LSC archives.]

*Geoff Amery (Reading) request occultation observer information to begin a new team.
*Saturn Occultation on March 2nd Observations received.
*Miss Botley suggests spectroscopic observation of occultations of bright stars.

**Note from the writer:** Miss Botley was curious. In a recent report (2018), it was calculated that diffraction effects during a graze occultation will cause a time dependency on wavelength.
http://astrode.de/esop23a.htm

**Reports:**
Jan Manek (CZ) shared some high frame-rate recordings on UK Occultations group.
https://ukoccultations.groups.io/g/main Star ZC 1244 (below) showed a simulated diffraction pattern for a 9mas diameter star. The relatively long fade, might cause a visual observer to report a double star. It is in fact a suspect double. The recording was made at 333 fps. The software is "LiMovie"




T Haymes
The poor UK weather continues to disrupt many of my occultation observations. I do hope readers fair better in the coming weeks. April is usually the best month for Lunar Occultations. If any member would like a set of predictions ( 1 year ) for their location, then I can provide them by email:

tvh.observatory@btinternet.com

**Occultation predictions for 2024 April (**Times at other locations will +/- a few minutes)
**Oxford: E. Longitude -001 18 47, Latitude 51 55 40**

| day yy | mmm | d | Time h | m | s | Ph | Star No | Sp D* | Mag v | Mag r | % ill | Elon | Sun Alt | Moon Alt | Az | CA o | Notes |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 24 | Apr | 11 | 20 | 51 | 22.4 | D | 598 | SG0 | 5.5 | 5.0 | 13+ | 42 | | 18 | 286 | 50S | 36 Tau |
| 24 | Apr | 12 | 21 | 16 | 40.0 | D | 76945 | A2 | 7.5 | 7.4 | 21+ | 55 | | 25 | 282 | 7S | |
| 24 | Apr | 12 | 21 | 50 | 0.9 | D | 76965 | cG | 7.6 | 7.2 | 21+ | 55 | | 20 | 288 | 85S | |
| 24 | Apr | 13 | 21 | 26 | 16.3 | D | 77957 | B9 | 8.7 | 8.6 | 31+ | 67 | | 33 | 274 | 75S | |
| 24 | Apr | 13 | 22 | 4 | 9.3 | D | 77987 | B9 | 8.5 | 8.5 | 31+ | 67 | | 27 | 281 | 67S | |
| 24 | Apr | 15 | 0 | 26 | 38.2 | D | 1088 | A4 | 5.8 | 5.7 | 42+ | 81 | | 14 | 295 | 61S | 47 Gem |
| 24 | Apr | 15 | 21 | 47 | 32.5 | D | 1206 | G8 | 5.9 | 5.3 | 51+ | 91 | | 44 | 254 | 49N | omega Cnc |
| 24 | Apr | 15 | 21 | 48 | 25.9 | D | 79855 | A0 | 8.0 | 7.9 | 51+ | 91 | | 44 | 254 | 36S | |
| 24 | Apr | 15 | 22 | 12 | 31.2 | D | 1211 | SA1 | 6.3 | 6.3 | 51+ | 91 | | 40 | 259 | 76S | 4 Cnc |
| 24 | Apr | 15 | 22 | 30 | 15.6 | D | 79874 | K7 | 8.5 | 7.7 | 51+ | 91 | | 38 | 263 | 58S | |
| 24 | Apr | 15 | 22 | 50 | 18.4 | D | 79888 | K5 | 8.2 | 7.5 | 51+ | 91 | | 35 | 267 | 76S | |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 24 | Apr | 16 | 22 | 44 | 15.3 | D | 80499 | K0 | 8.2 | 7.6 | 61+ | 103 | 40 | 253 | 74N |
| 24 | Apr | 17 | 1 | 12 | 53.4 | D | 1342K | G5 | 7.6 | 7.3 | 62+ | 104 | 18 | 282 | 73S |
| 24 | Apr | 18 | 21 | 5 | 3.1 | D | 99115 | G5 | 8.5 | 8.0 | 78+ | 124 | 51 | 189 | 61N |
| 24 | Apr | 19 | 0 | 8 | 50.8 | D | 99157p | F2 | 7.4 | | 79+ | 125 | 33 | 245 | 40S |
| 24 | Apr | 19 | 20 | 45 | 59.3 | D | 118682 | K0 | 8.2 | 7.6 | 85+ | 135 | 45 | 168 | 37S |
| 24 | Apr | 21 | 0 | 37 | 33.2 | D | 119114 | F2 | 7.2 | 7.0 | 92+ | 147 | 30 | 226 | 33S |
| 24 | Apr | 21 | 2 | 8 | 21.2 | D | 119138 | K0 | 7.4 | 6.9 | 92+ | 148 | 18 | 247 | 88S |
| 24 | Apr | 21 | 3 | 2 | 50.8 | D | 1730w | K2 | 6.2 | 5.5 | 93+ | 148 | 10 | 258 | 45S |
| 24 | Apr | 22 | 0 | 53 | 6.0 | D | 1814S | K5 | 6.7 | 5.8 | 96+ | 158 | 27 | 217 | 50N |
| 24 | Apr | 27 | 2 | 6 | 53.3 | R | 2397 | K1 | 6.5 | 5.9 | 90- | 144 | 10 | 176 | 24S |

D* : The D column indicates a Double Star in the Washington Double Star Catalogue. The characters w,S,c etc indicate the type of double and is explained in Occult4 Help.

New doubles are being discovered in occultation recordings, particular close doubles. The separations are usually small and in the range 10-100 mas. Please send double star occultation reports to the LS. High frame-rate recordings are desirable when possible.

Contact the Occultation Subsection to request predictions for your location and instrument.

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**March 2014 Deliberate Mistake Competition Results.**

Unfortunately there were no correct entries for last month's Deliberate Mistake Competition where the image on page 6 was accompanied by the caption that the picture was obtained using a 90mm telescope. Of course the correct aperture should have read '300mm'. The only person to write in to correct the mistake was Rod Lyon, but as he provided the image in the first place he was automatically disqualified. This means that the first prize of a fully equipped lunar observatory located in the middle of the Exmoor Dark Sky Reserve went unclaimed. Better luck next time!

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**Forthcoming Book.**

With few books available to satisfy us lunar buffs, the following may be of interest and is due for release in May 2024:

***Still as Bright: An Illuminating History of the Moon from Antiquity to Tomorrow*** by Christopher Cokinos (http://pegasusbooks.com/books/still-as-bright-9781639365692-hardcover).

It is already advertised on that large website named after a river, and there are some reviews *but* not customer reviews. I have read one of his previous books ***The Fallen Sky: An Intimate History of Shooting Stars*** which was informative and well written, and on that basis may well look at this new offering as well.

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**Catena Krafft by Tony Deyes.**

Tony wrote in:

*I was interested in David Finnegan's analysis in the February Lunar Circular of the origins of Catena Krafft (p.18). David suggests that the "catena chain .... originated during the impact that formed Cardanus" and should thus be called Catena Cardanus. Charles Moore in his Craters of the Near Side Moon (p.337) offers a different analysis and explanation of the feature. He questions whether the 'catena' is a series of craters at all or rather, perhaps, a lava tube that collapsed to produce a series of pits. So is it a rima or catena? The fact that its name was changed in 1976 from Rima Krafft to Catena Krafft certainly seems to support David's analysis.*

**Ed.Notes:** Firstly, I would like to absolve Dave of any responsibility for the analysis of Catena Krafft, these were notes made by myself (Barry Fitz-Gerald) and I would not like anyone else to get the blame for going '*off piste'* with a whacky and potentially daft opinion. So I thought it might be worth explaining this idea about my comments on Catena Krafft a bit more fully.

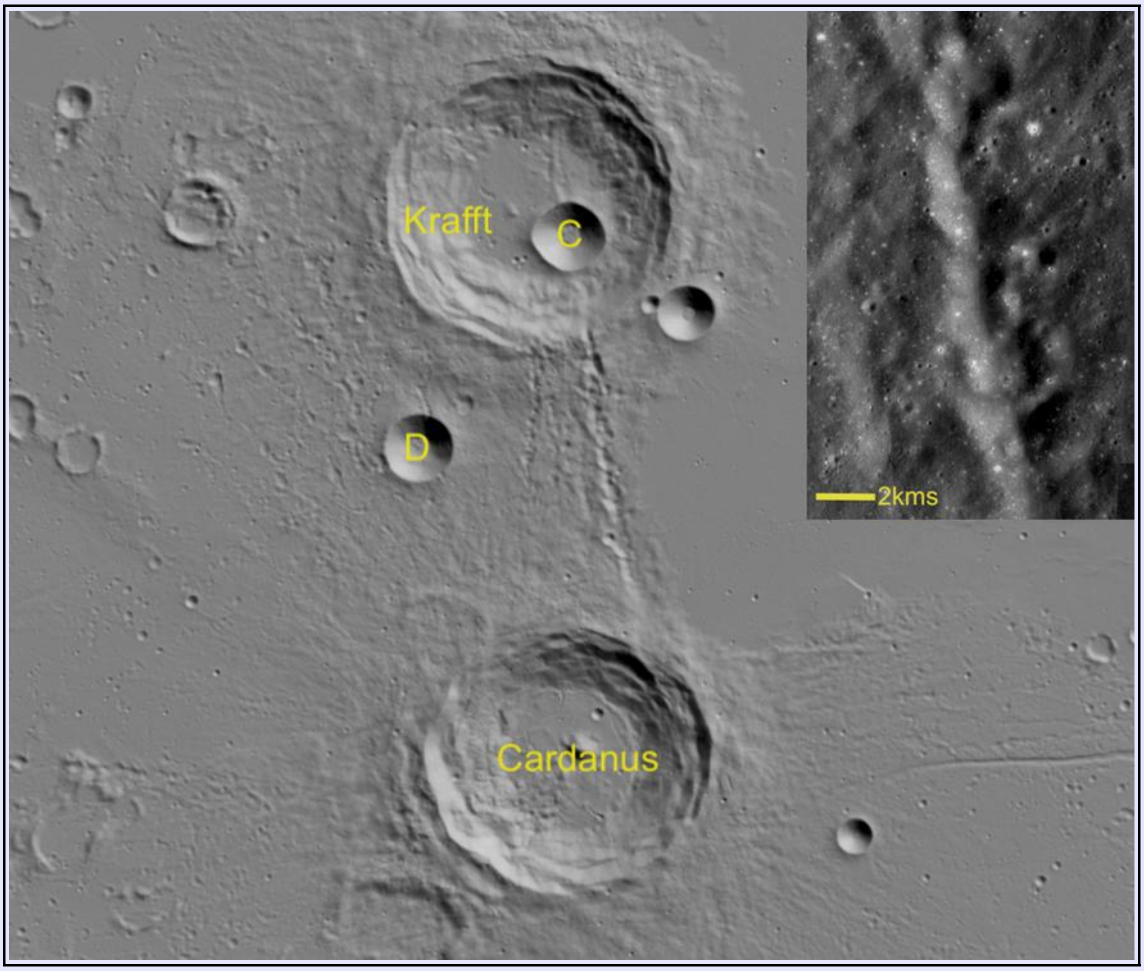



Fig.1

Fig.1 is a TerrainHillshade rendition of Cardanus and Krafft from Quickmap. Here you can see Catena Krafft running from just outside the NE rim of Cardanus towards the SSE rim of Krafft, where it cuts the crater rim and can then be traced as a fine line (unfortunately overprinted by Krafft C) that ends at the base of the northern inner wall. The inset shows a NAC image of the *catena,* and as can be seen it is clearly a crater chain consisting of individual overlapping craters, with the crater to the north in any one adjacent pair overlapping the crater to the south, which shows that the origin of the impactors was to the south, in the direction of Cardanus. You can also see the 'Herringbone Pattern' to either side of the *catena*, which is diagnostic of the simultaneous, closely spaced impacts typical of secondary cratering. So this shows that Catena Krafft is a secondary crater chain originating with a high degree of probability from Cardanus – as there is no other potential source to the south within reasonable proximity. The reason that the *catena* is not apparent closer to the rim of Cradanus is that it is smothered by proximal ejecta from Cardanus that was ejected from the crater in the final stages of excavation process, landing just outside the rim.

You can also see another fainter *catena* emerging from beneath this this proximal ejecta to the west and just about level with Krafft D, and which can be seen reaching up to the southern rim of Krafft, which it also cuts. You can continue this line across the floor of Krafft to where it converges with northernmost part of Catena Krafft, but again part of it is overprinted by Krafft C. So what we appear to have is two secondary crater chains, emerging from Cardanus, and heading north on a converging course to meet at the base of the northern wall of Krafft. Confirmation of this idea is provided by the morphology of the northern wall of Krafft as shown in the Lunar Orbiter IV image in Fig.2.

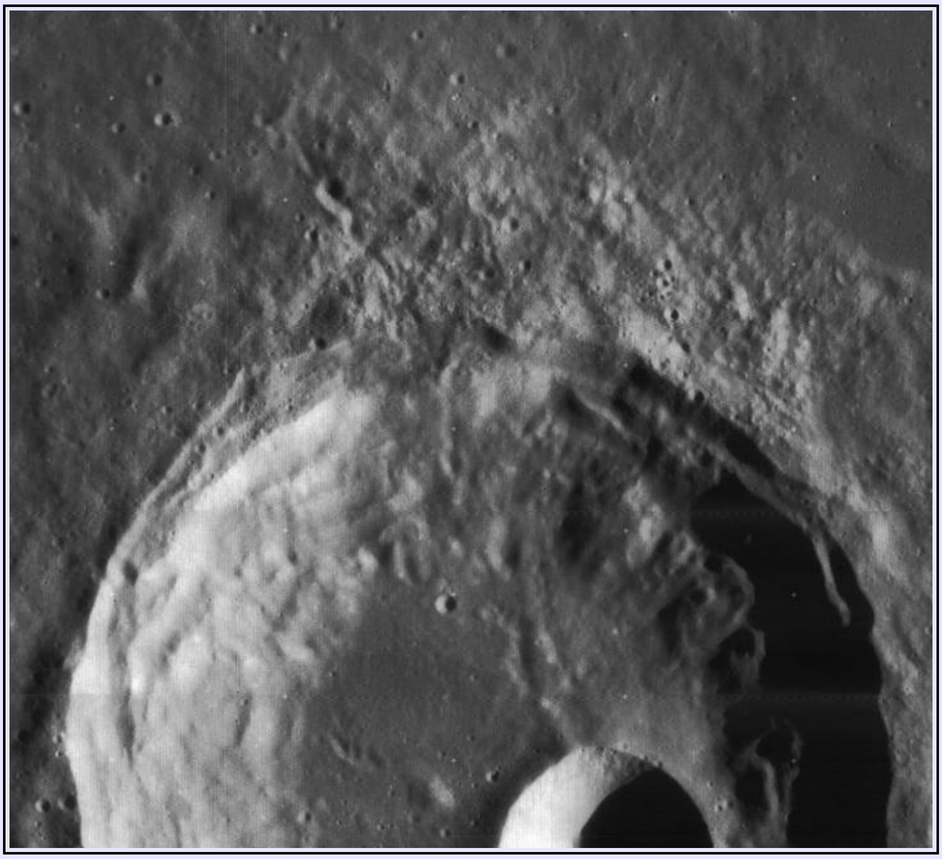


Fig.2.

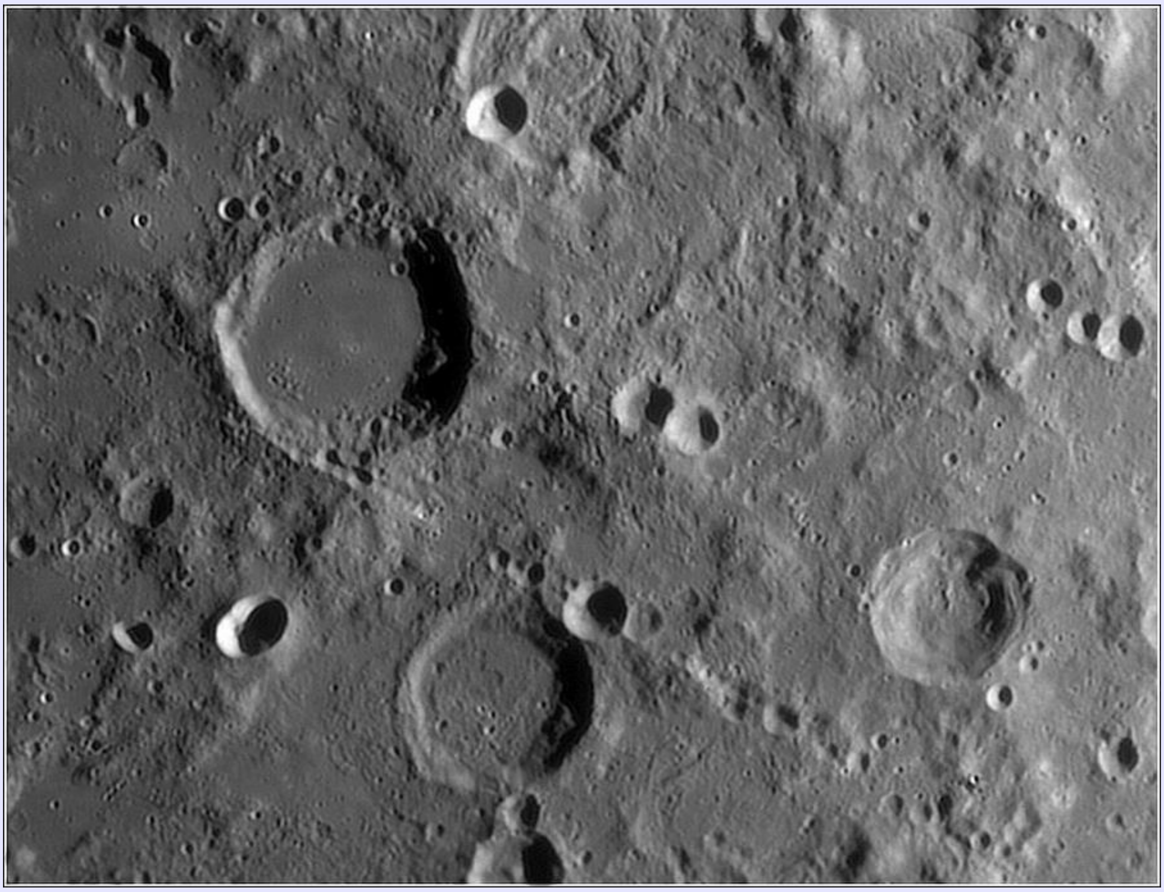
Here you can see that the crater rim of Krafft has collapsed inwards and outwards where these crater chains converge, and there is also disruption to the northern rim itself which shows where it has been blasted away by the impact of the ejecta from Cardanus.

So, why do we have two converging crater chains? Well, collimated features often form in the downrange part of the ejecta of low angle impact craters, just think of the '*comet rays*' associated with Messier A. These features often take the form of crater chains, and there are numerous examples on the Moon to choose from. I speculated some time ago that the ridge running across Alphonsus is actually ejecta from Arzachel that is sitting on top of an earlier formed *catena* that also originated in the Arzachel impact event*. Is there any evidence that Cardanus was formed by a low angle impact – well there is a suggestion in the remaining ejecta that we may be seeing a 'butterfly pattern' distribution which may be consistent with an impact from the south, but this is not too clear. There is also no obvious Zone of Avoidance to the south which you might expect, but despite these uncertainties it looks like Catena Krafft, has nothing to do with Krafft itself, and that it just happened to be sitting in the way when the Cardanus impact event generated the double blast of ejecta that formed the *catena*.

*Topography of the Alphonsus and Arzachel area of the Moon, JBAA Vol.124, No.1, Feb.2014.

**If it's good enough for Jupiter…. By Bill Leatherbarrow**

Section members over a certain age will remember the excitement in July 1994, when fragments of comet Shoemaker-Levy 9 slammed into Jupiter leaving a chain of black impact scars in the Jovian atmosphere. Younger members will not have witnessed this, but they can draw some comfort from something similar, much older and much closer to home.



*Catena Abulfeda, 2024 March 17, 18.35 UT, OMC300 Mak-Cass (image by Bill Leatherbarrow)*

Abulfeda is a fairly unremarkable 62km-diameter impact crater south-east of the centre of the Moon's visible disc. Its walls are largely intact and it has a relatively smooth flat floor with no evidence of a central peak. It main point of interest is a 210km-long chain of craters that strikes off in a south-easterly direction from outside Abulfeda's southern rim. This is Catena Abulfeda.

For a time it was thought that Catena Abulfeda was volcanic in origin – a chain of caldera-pits collimated along a line of crustal weakness. After all, surely it would be unreasonable to think that any external impactors might arrive in such a neat and orderly fashion? However, once it was recognised that the craterlets comprising the chain possessed the bowl-shaped floors and raised rims typical of impact pits, another explanation emerged. Might these not be secondary impact craters made by blocks of material thrown out in a collimated line from a nearby larger impact event? The problem with this is that the chain – aligned at a tangent to Abulfeda itself and apparently younger than that crater on the basis if how it superimposes on the crater rim – did not appear to point back to any obvious point of origin. It did not match up with the Nectaris basin to the east, or with anything suspiciously responsible to the west.

The Shoemaker-Levy impact opened up a further possibility, which now seems most likely – that Catena Abulfeda is the result of a cometary impact where the impactor fragmented before arrival, disrupted by the Moon's gravity in the same way that Shoemaker-Levy 9 was broken up by Jupiter. The fragments, arriving at an angle to the lunar surface, would have created the aligned string of impact craters making up the catena. A final point: it seems likely that the largest crater in the chain, Almanon C, might be a later arrival and not part of the original chain, since it looks fresher and appears to overlap the unnamed crater to its east (which does appear to be part of the original chain).

# Images and Drawings

## Lunar South Pole.

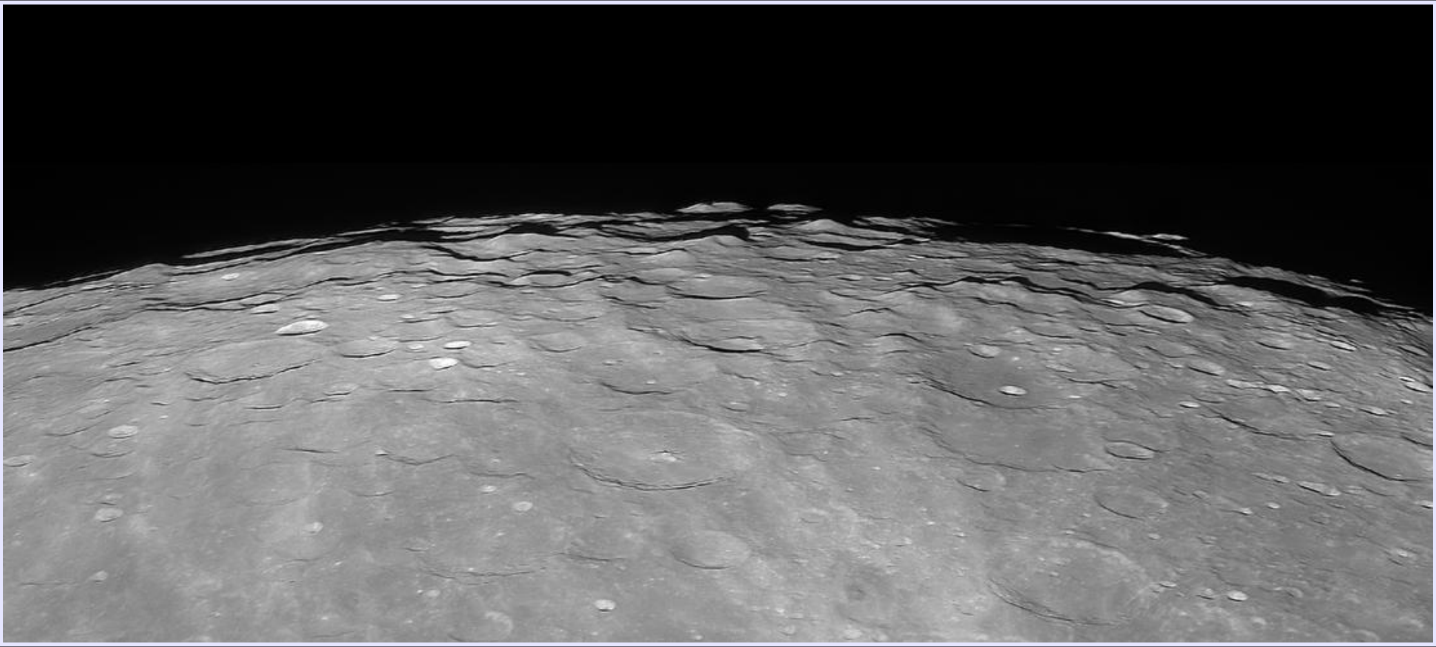
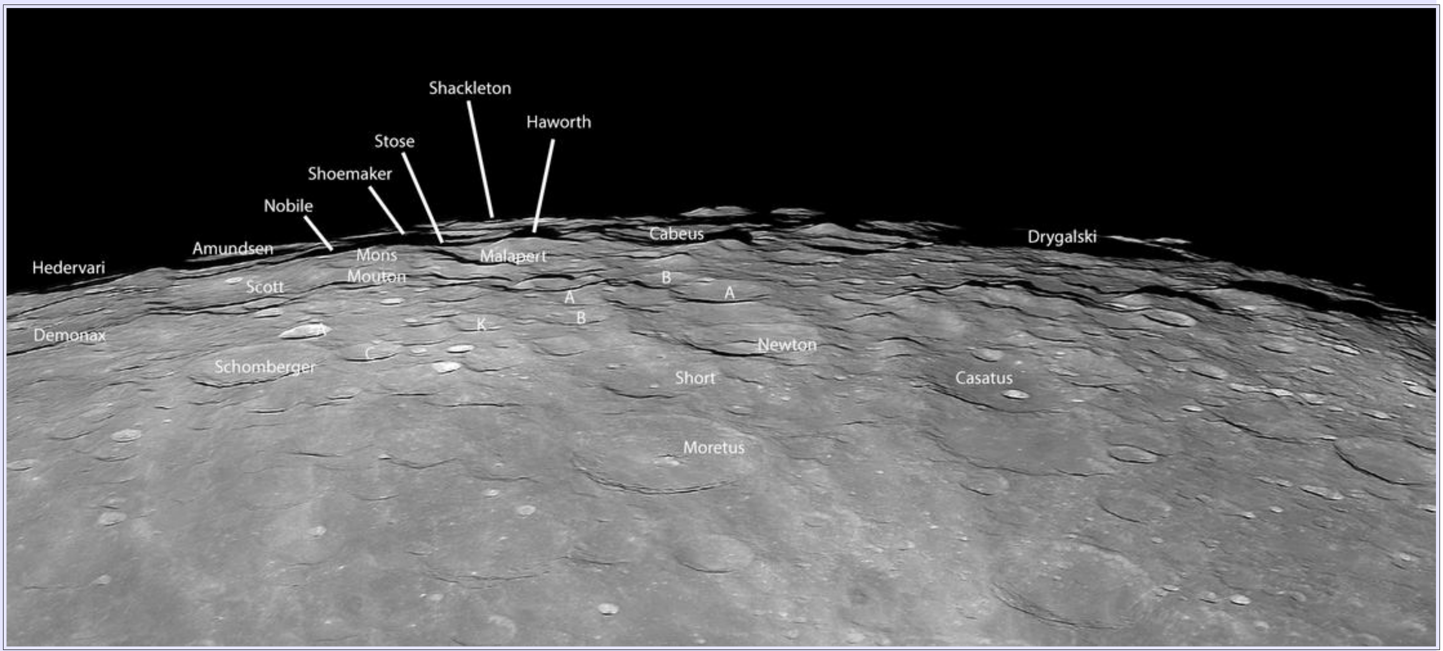


**Image taken and annotated by Mark Radice and taken on 23 February 2024 at 2207 UT with a Celestron**




**C11 at f20, with a Player One Saturn M camera.**

**Mons Piton.**


**Drawing and observing notes (below) by Trevor Smith with details of time/date and equipment as shown.**

# MONS PITON

THE MOON WAS RIDING HIGH IN THE SKY ON THE EVENING OF 17/03/24 BUT THE CONDITIONS WERE NOT TOO GOOD HERE IN CODNOR, DERBYSHIRE WITH A SLIGHT HAZE AND SOMEWHAT POOR SEEING OF ABOUT ANT IV.

THE MOON WAS 57% ILLUMINATED AND JUST NOTICEABLY PAST FIRST QUARTER TO THE NAKED EYE.

MONS PITON WAS INSTANTLY SEEN IN THE TELESCOPE EYE-PIECE TO BE RIGHT ON THE TERMINATOR AND VERY BRIGHT.

ONES FIRST IMPRESSION WHEN LOOKING AT MONS PITON IS ONE OF A HIGH AND ISOLATED MOUNTAIN WITH STEEP SLOPES BUT IN REALITY THIS MOUNTAIN MASSIF IS MORE IN KEEPING WITH A LARGE HILL.

IT HAS A BASE AREA OF SOME 200 $\text{K.M}^2$ AND A MAXIMUM HEIGHT OF ABOUT 2.3 KM.

WHEN THE MOONS PHASE IS SLIGHTLY MORE ADVANCED AND PITON IS SLIGHTLY FURTHER FROM THE TERMINATOR IT CAN LOOK VERY SPECTACULAR AS IT CASTS LONG BLACK SPIRE-LIKE SHADOWS ACROSS THE FLOOR OF MARE IMBRIUM

TREVOR SMITH.

**Rima Hesiodus.**

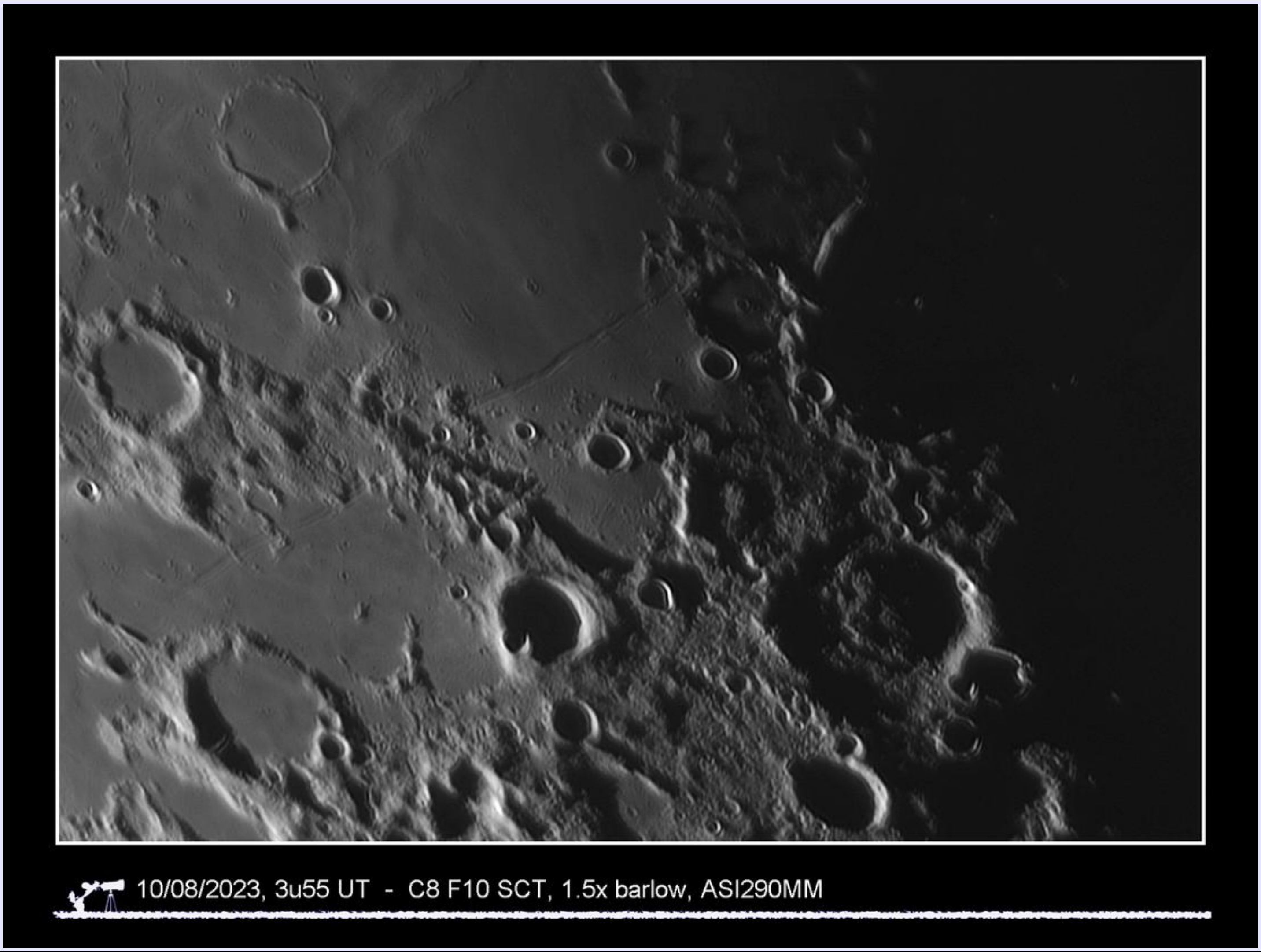



**Image by Alexander Vandenbohede with details of time/date and equipment as shown.**

**Ed Notes:** Rima Hesiodus looks like any number of the other graben that exist around the margins of the lunar mare. They form when the lunar crust is pulled apart under extension/tension with two parallel faults developing, and the ground between them then dropping downwards to form an elongate, square sectioned trough. When the faulting starts at a number of places along a line of extension, the faults can 'grow' towards each other and eventually meet up, but the link is not always perfect and the sections can be slightly miss aligned resulting in structures called 'relay ramps'. You can just about see one of these to the north of Hesiodus A where the graben looks a bit 'pinched'.

The graben is about 3kms wide and about 140-160m deep where it is most prominently visible in Alexander's image. But it is not a simple flat bottomed trough as you might expect from the process described above, and along much of its length it has a raised central floor flanked by shallow ditches (~20m deep) which run along the base of the fault scarps as can be seen in the cross section in Figs.1 and 2. This seems unusual and it is not really obvious why the graben floor has this configuration. It is not however unique, you can see the same ditches along some sections of Rimae Hippalus, suggesting that a similar process is at work.

As noted above, graben are thought to form by crustal extension, and this can be the result of a couple of processes. The first which probably accounts for the Rimae Hippalus complex is crustal sagging as the central parts of a mare subsides under the weight of lava erupted within the original basin (basin circumferential graben) or they may form as a volcanic dike rises to the surface forcing the overlying crust upwards, which is thought (by some) to be the origin of Rima Sirsalis.

If Rima Hesiodus was the result of lavas ascending in a dike, it might be possible to suggest that the raised floor was produced by these lavas as they continued to push upwards after the graben had formed. This would be similar to the process responsible for producing Floor Fractured Craters or suggested by some to be responsible for Concentric Craters.

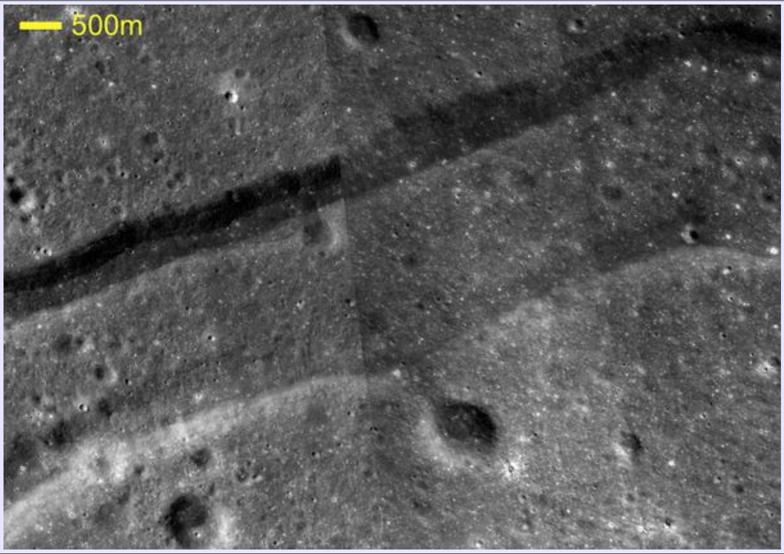



Fig.1 LROC NAC image of a section of Rima Hesiodus showing the ditches running either side of the slightly raised floor.

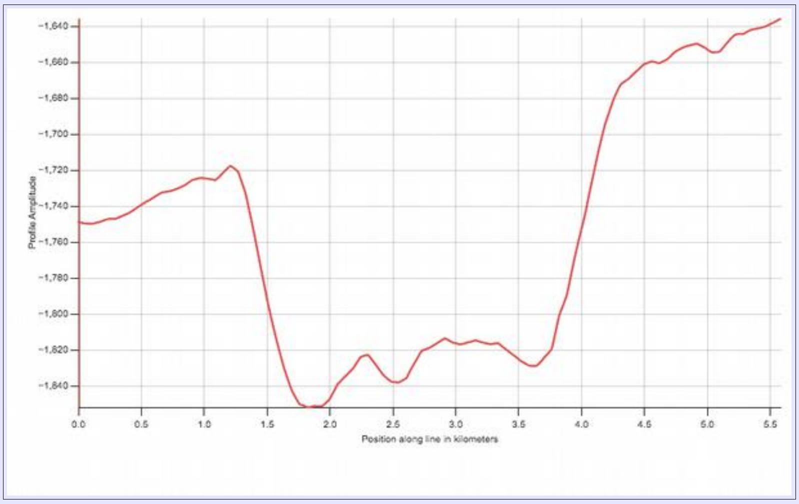



Fig.2 Topographic profile across Rima Hesiodus showing the ditches.

In the present cases however this does not appear to be the case, as Rimae Hippalus is a circumferential graben, and therefore likely to be tectonic in origin, and Rima Hesiodus is located on a regional bulge that dominates the southern shore of Mare Nubium and is in that case probably also a tectonic feature. This leaves the origin of the ditches and raised floor unexplained, but there is always the possibility that whilst these are broadly tectonic in origin, they may have been invaded at a later stage by dikes which did raise the central part of the floor – but that might be a stretch of the imagination. Another possibility is that the ditches formed as material drained down along the marginal faults and into subterranean voids, leaving the central part of the floor *apparently* bulging upwards. This might be a viable process as some graben are associated with what appear to be collapse pits where such a process may have operated*. Whatever is going on it is slightly more complex than a simple *graben* model suggests.

*Ahrens..C (2021) The Spatial Relationship of Graben and Pit Craters at Rimae Daniell and the Implications of Scarp Formation. 52nd Lunar and Planetary Science Conference, LPI Contribution No. 2548

**Waning Gibbous Moon.**

**Image by Bob Bowen and taken on 3rd November 2023 at 03:13hrs using a SkyWatcher ST80, 400mm f5, fitted with a 2x TelePlus Teleconverter to increase magnification and green Moon Filter.**

**Tycho and Clavius.**

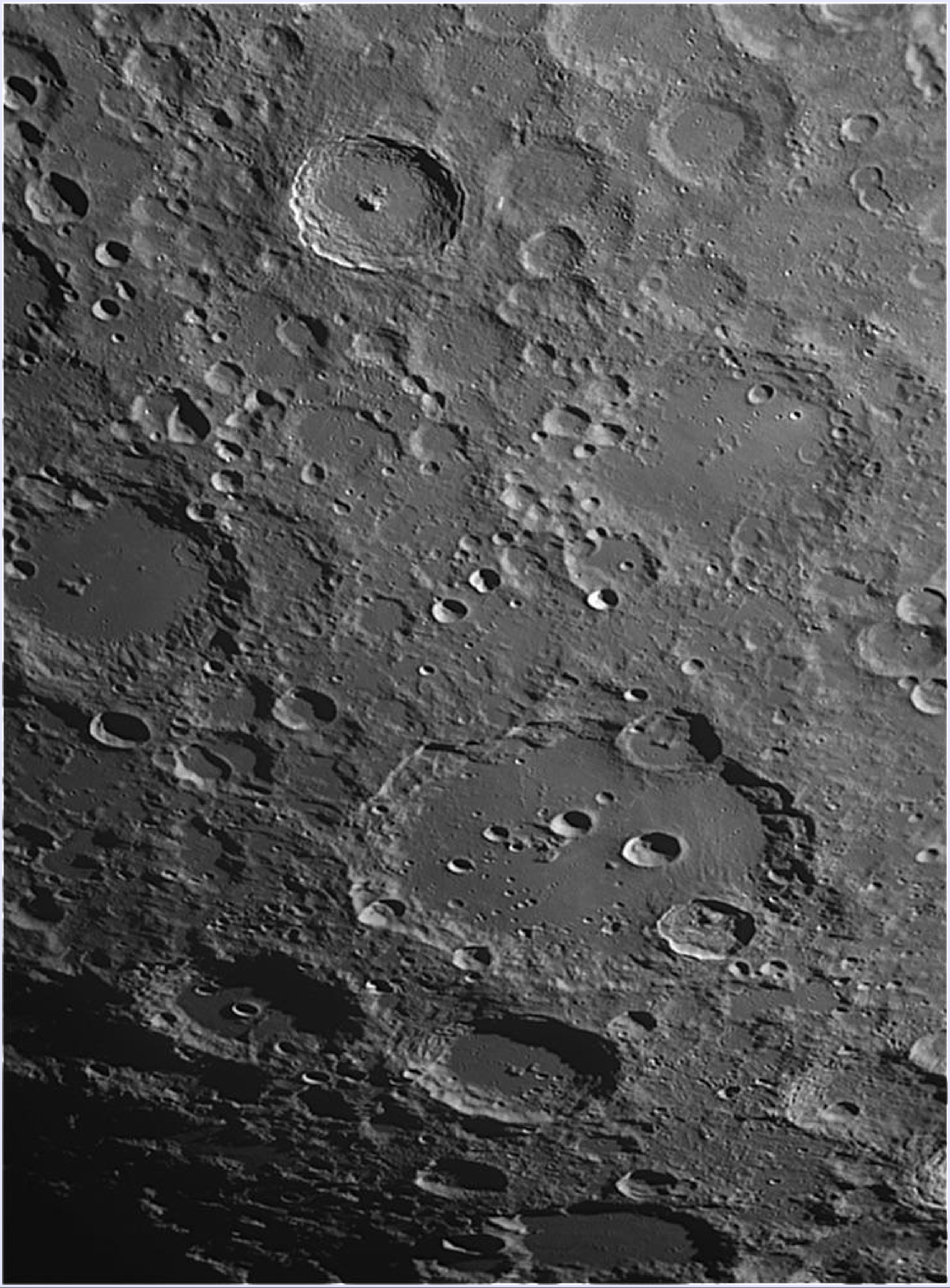


**Image by Bob Stuart taken on 2nd March 2023 at 1739UT.**

**Apianus and Playfair.**

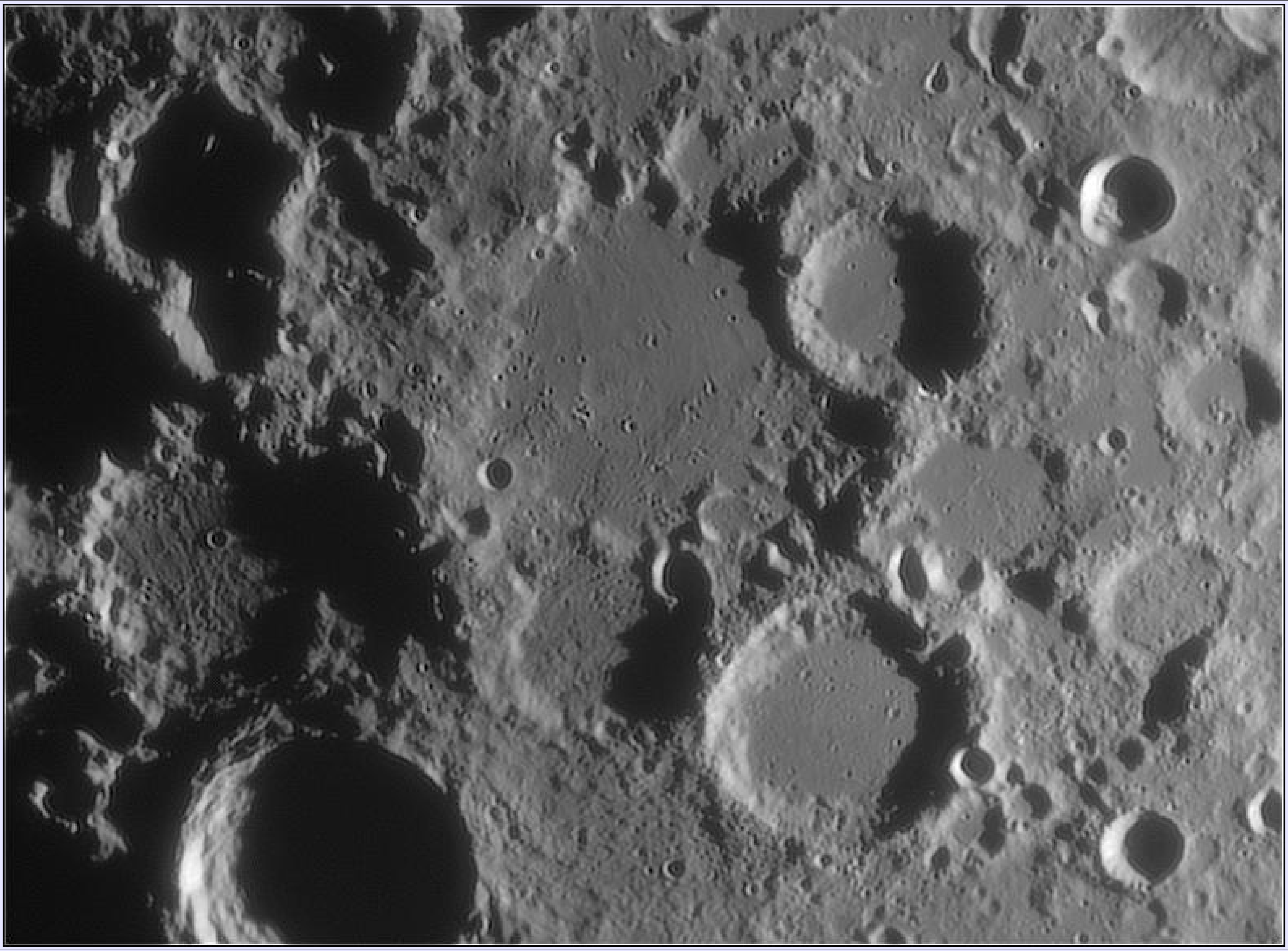


**Image by Bill Leatherbarrow and taken at 18:32hrs on 17th March 2024 using an Orion Optics OMC300 Maksutov Cassegrain.**

**Ed. Notes:** This part of the Southern Highlands sits on a fairly thick bit (~30-50kms) of the lunar crust, but shows evidence of ancient volcanism in the form of the smooth plains type units forming the floor of craters like Apianus and Playfair. Examples of more recent examples of volcanism also exist such as the crater Airy with its unusual floor, divided into slab like plates of probable volcanic origin. In 2008 Chuck Wood discussed some possible volcanic features in this area as potential evidence for the existence of the Werner-Airy Basin* noting that the basin was not really well defined *topographically* but more so by the presence of light plains material noted above. The presence of the basin, is it is fair to say still in the realms of the *possible but no proven*, but telescopically there certainly looks like there is something there**.

Whilst checking the Quickmap site I noted an unusual curving arc in one of the GRAIL Bouguer gravity gradients overlays, that lies *within* the presumed Werner-Airy Basin, and *appeared* to correspond to a quasi-circular feature in the Colour Shaded Relief overlay and shown in Fig.1 below. As can be seen the blue curving feature (right panel) *might* be the western edge of a buried structure and is just visible topographically (left panel black arrows) where it just clips the eastern rims of Aliacensis and Werner. But rather than forming a circle it forms more of a 'U' shape with the open end pointing towards Mare Nectaris. If there is a circle here it is about 300kms in diameter with the geometric centre roughly corresponding to Apianus P.

The blue in the GRAIL image shows the presence of dense rocks, possibly in the form of volcanic dikes and it is tempting to speculate that these might define the fracture system surrounding a small pre-Nectarian Basin.

The absence of a compete circle is obviously a problem for this idea, but not necessarily a fatal one and the 'U' shape we see could be a result of radial, lava filled fractures extending away from the Nectaris Basin and forming the two arms of the 'U'.

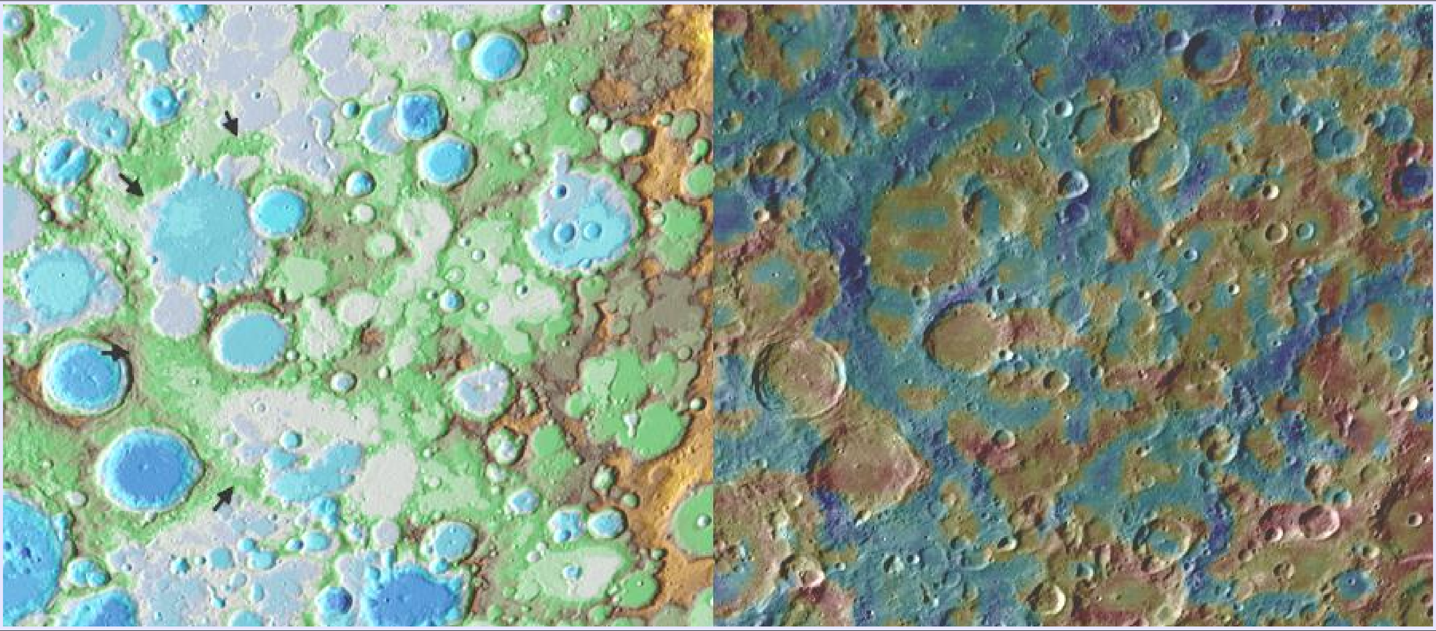


Fig.1 Left Colour Shaded Relief overlay and right GRAIL Bouguer gravity gradients overlay from Quickmap showing a potential buried circular structure within the Werner-Airy Basin. The black arrows in the left panel show the location of the 'rim' which appears to correspond to the blue arc in the right panel.

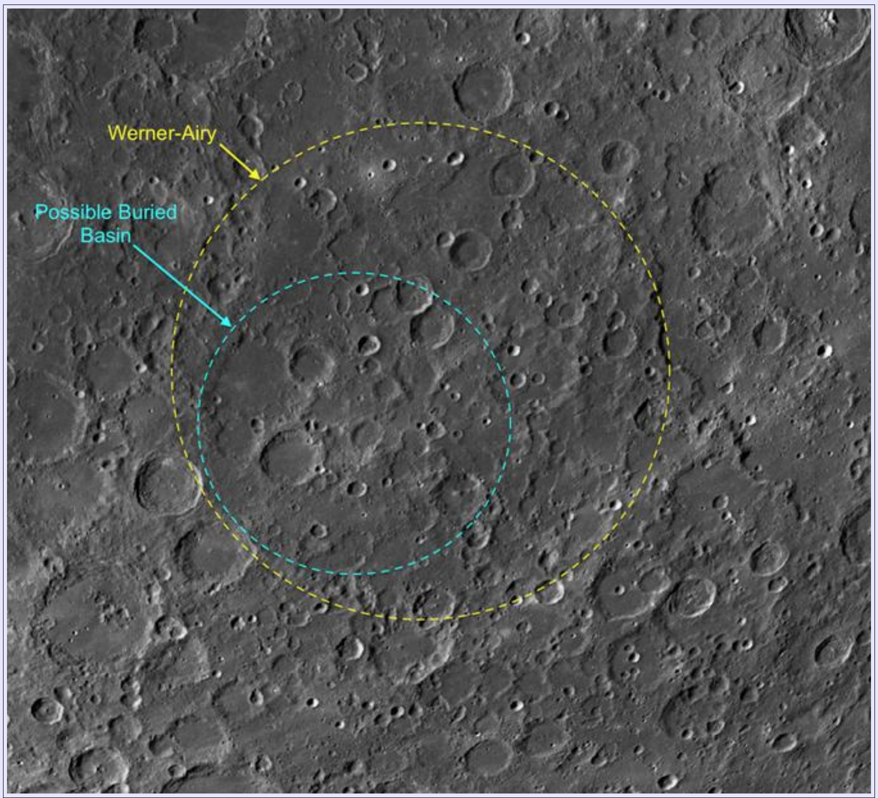



Fig.2 Location of the possible buried structure within the Werner-Airy Basin.

Of course any suggestion of the presence of a buried structure based on topography is fraught with uncertainty as we could just be joining the dots so to speak to form a circle (or part thereof) but the correspondence between the dots in this case with the GRAVITY anomaly is interesting at least.

*Wood, C.. (2008). The Werner-Airy Basin and Hints of Highlands Volcanism. Lunar and Planetary Science XXXIX
** See https://alpo-astronomy.org/lunarblog/wp-content/uploads/tlo/tlo202205.pdf for a nice image by Tony Cook of the basin.

**Tycho in Colour.**

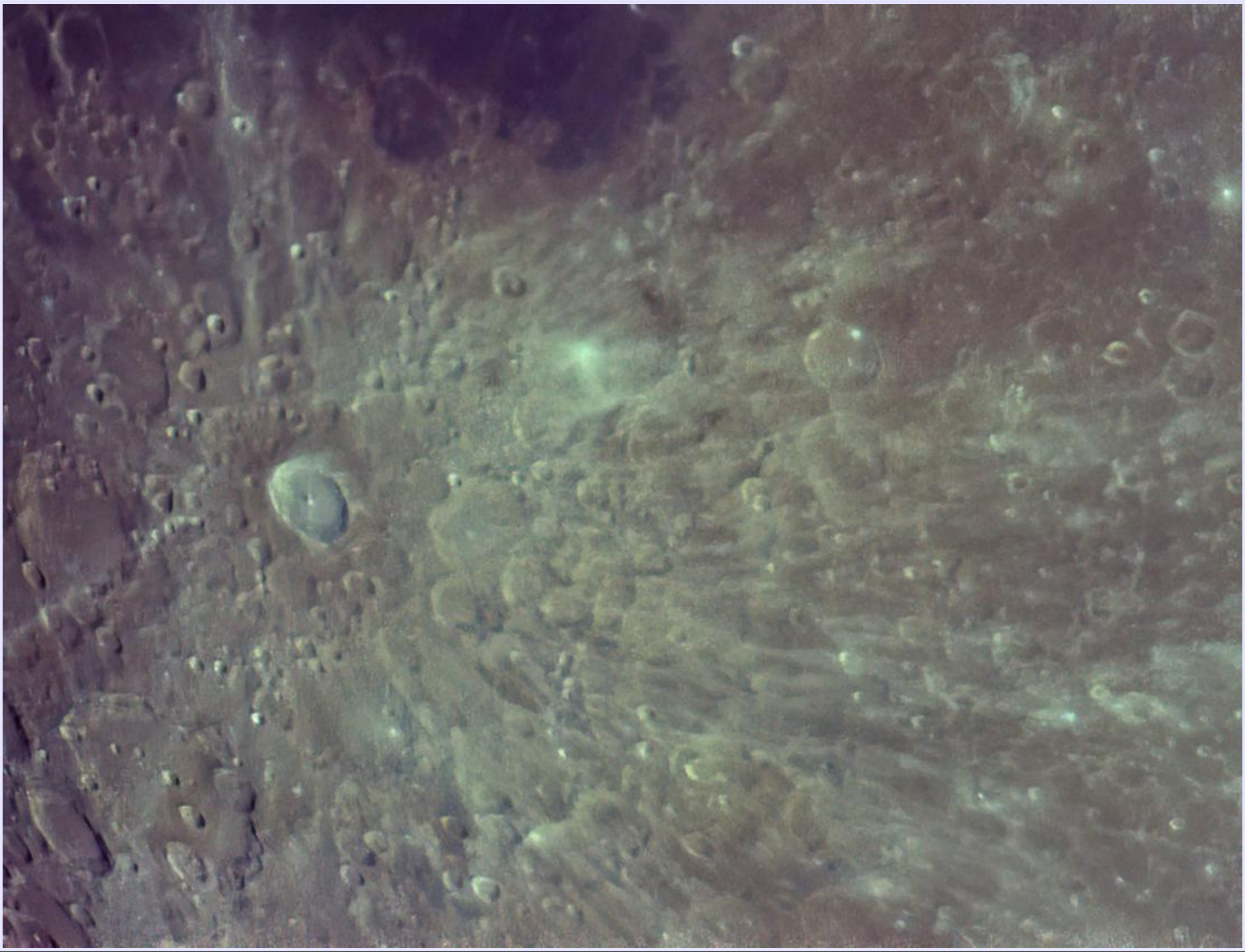


**Image by Chris Longthorn taken on 24th November 2023 using a StellaLyra 200mm F/8 Ritchey Chretian Classical Cassegrain and a ZWO ASI 224MC camera at prime focus**

**Ed. Notes.** This colour image brings out the darkish halo surrounding Tycho rather well, a feature that is quite prominent visually. It appears to correspond to extensive impact melt rich ejecta deposits with elevated concentrations of mafic minerals such as olivine and clinopyroxene as well as iron. It is optically immature, which is typical of impact melt deposits in general. The distribution is as can be seen asymmetric being more widespread to the NE and SE which would be consistent with the fact that Tycho was formed by a low angle impact (› 25 – 45°) from the SW. Something else which may have played a part in the distribution we see is the collapse of the inner SW wall, which could have displaced the pond of melt on the crater floor towards and then up and over the opposite rim.

Impact melt can look very similar to volcanic lava flows, but they differ in that melts form at the much higher temperatures (possibly as high as 2000°C) generated during the impact process, and as a consequence tend to be much less viscous that volcanic lavas as silicate melt viscosity decreases with increased temperature. This allows them to form ponds within local hollows and thin veneers covering the adjacent terrain. It is thought that it would take about a week for the melt formed during the Tycho impact event to cool and solidify in to the distribution we see* meaning that even after the dust settled after the impact event the melt deposits continued to flow, pond and infiltrate the ejecta blanketing the terrain surrounding the crater. So even after the crater formed it would have been surrounding by a warm red glow that could have been visible to any dinosaurs with a telescope that happened to be looking up.

*Einat L., et:al (2021) Emplacement conditions of lunar impact melt flows, Icarus, Volume 369

**Schickard, Inghirami and Wargentin.**

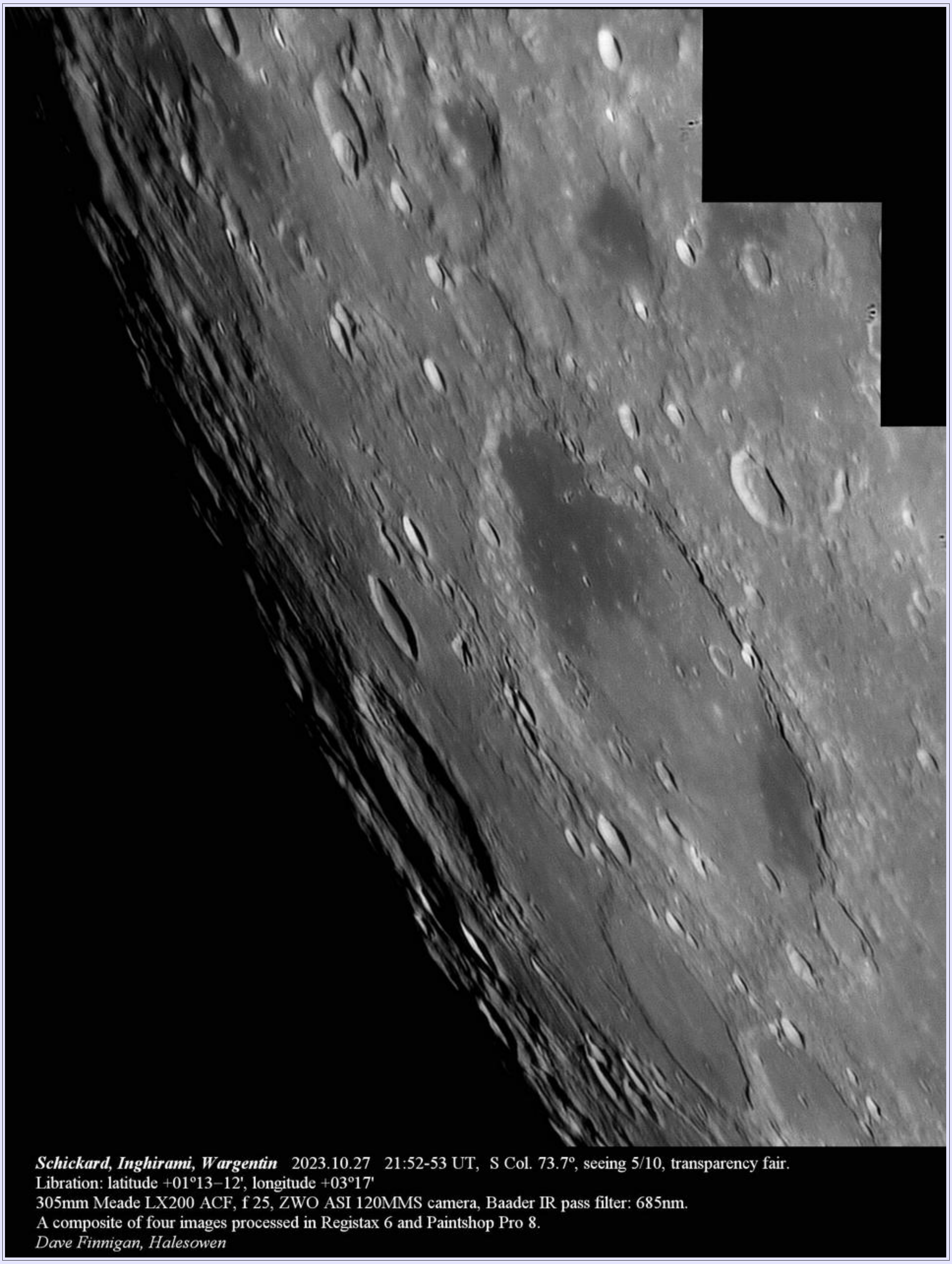



**Image by David Finnigan with details of time/date and equipment as shown.**

**Posidonius.**

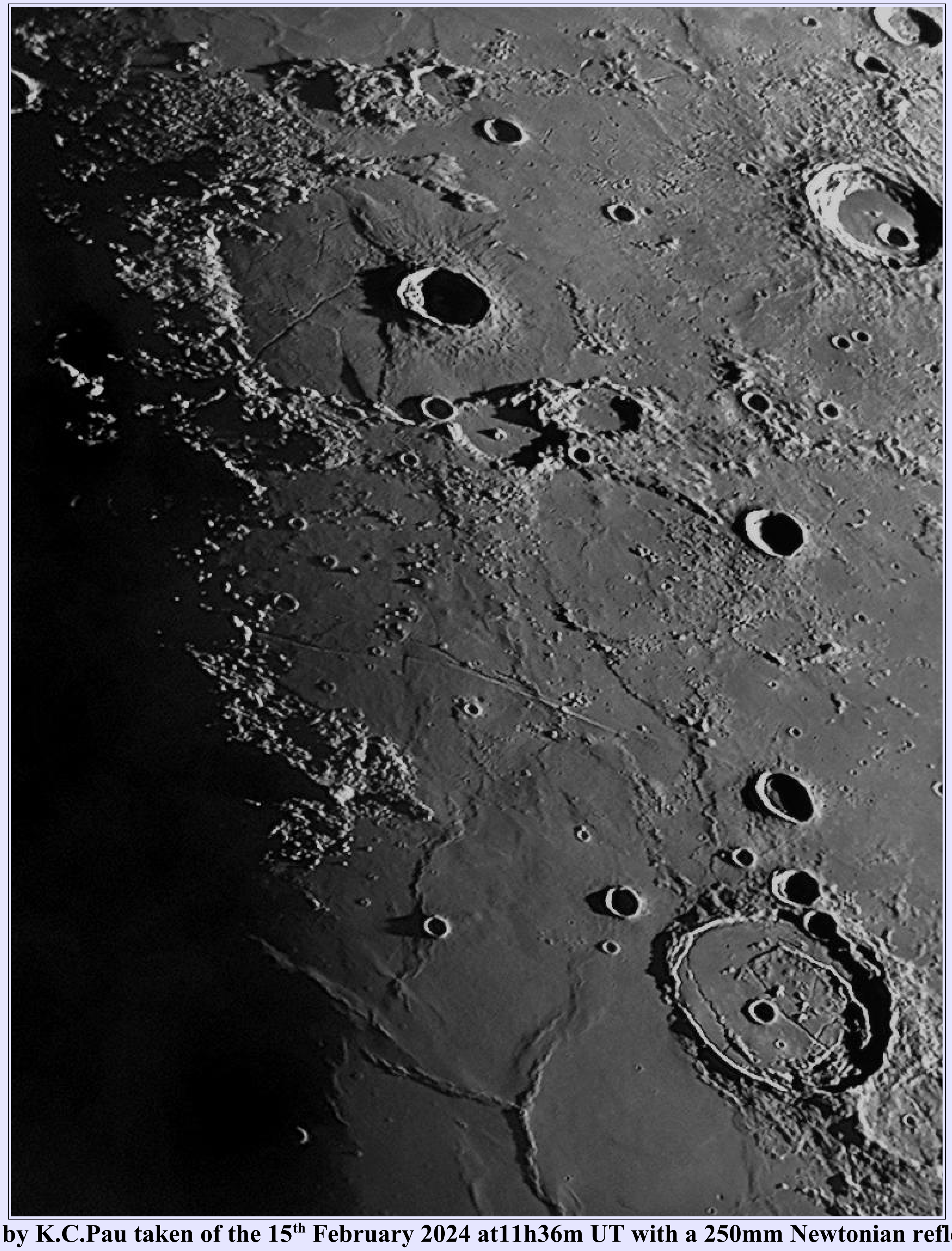


**Image by K.C.Pau taken of the 15th February 2024 at11h36m UT with a 250mm Newtonian reflector + 2.5X barlow + QHYCCD 290M camera**

**Copernicus and Montes Carpatus.**

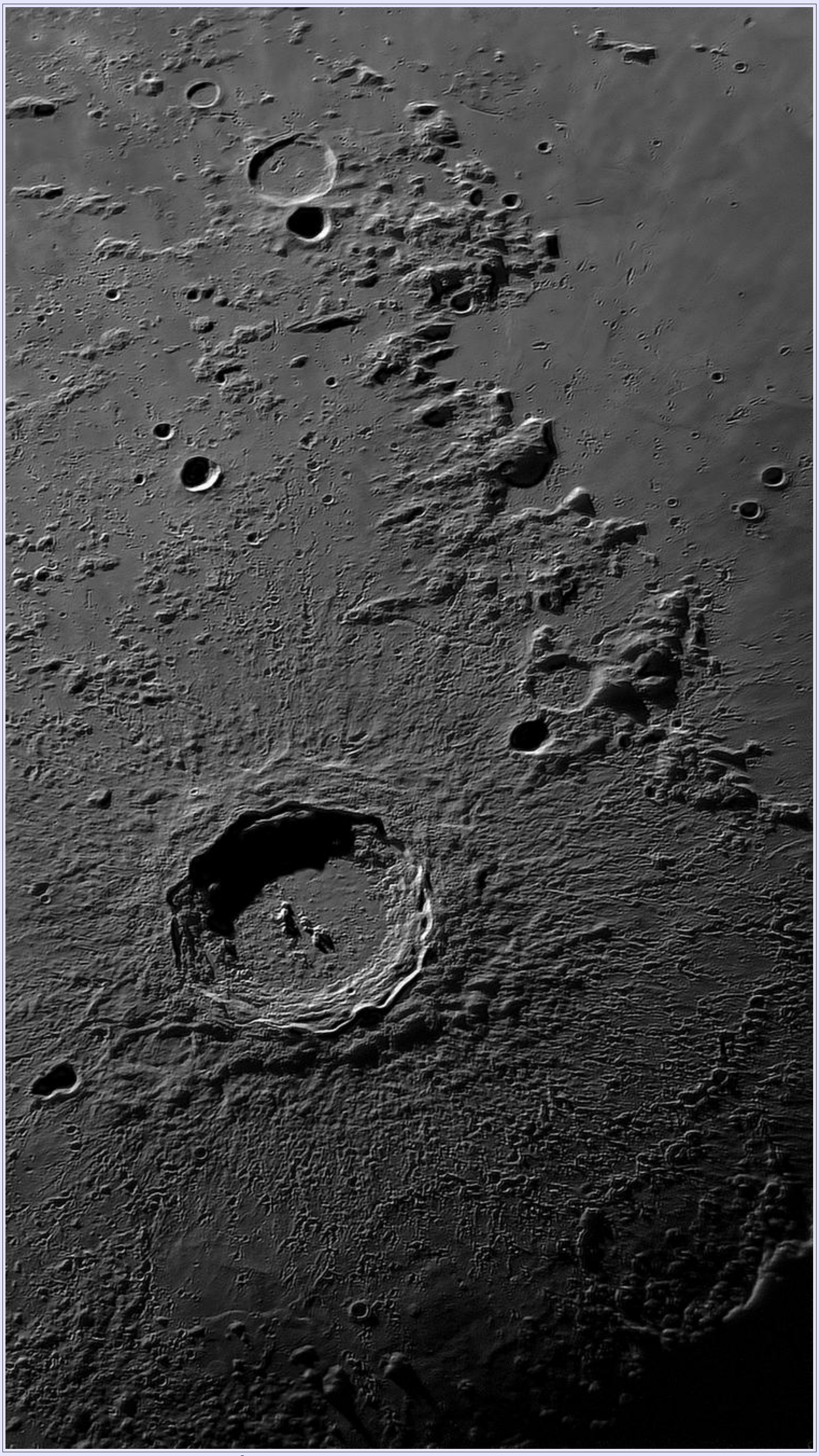


**Image by Leo Aerts and taken on 10th Augustus 2023 with a Celestron C14, red filter and ASI 178MM.**

**Vallis Alpes.**

**Image by Maurice Collins taken on 25th August 2023 at 0749UT using a ETX-90 and QHY5III462C camera.**

**Ed. Notes.** This view from Imbrium, through the Montes Alpes and on to the low lying tongue shaped extension of Mare Frigoris to the NE of Aristoteles provides an interesting perspective on this part of the Moon. This low lying area between Aristoteles and Gärtner is underlain by part of the network of fractures that surround Oceanus Procellarum as revealed in the GRAIL gravity data. These fractures appear to be filled with dense volcanic rock, and where they are located, the crust is thin and the surface depressed forming broad shallow troughs such as the section of Mare Frigoris to the north of Plato. The mare surface between Aristoteles and Gärtner is similarly depressed, with the central part about 600m lower than the surroundings. This crustal sagging probably accounts for the complex of wrinkle ridges that cross the mare surface to the north of Lacus Mortis, as well as the graben Rima Sheepshanks which crosses the 'open mouth' of Gärtner.

The unnaturally straight western edge of Lacus Mortis is quite prominent in this image, with the the lacus having a distinctly hexagonal look to it. If Lacus Mortis is an impact basin it might be possible to suggest that these straight edges are the result of a pre-existing fault complex controlling the excavation process, but it is not at all clear that it is an impact basin, even though that would seem the most logical conclusion. Many small impact basins look like 'bull's eyes' the GRAIL data with a marked circular patch of thin crust marking their centres, we do not see this in Lacus Mortis. But if the lacus is extremely ancient then it is possible that any crustal thinning is no longer evident, and it is possible that many ancient basins are hiding away beneath the surface without any conspicuous gravity anomaly to give them away. What we can say is that it has experienced a phase of uplift which has resulted in the production of Rimae Burg and the other fault related features that cut its surface.

**Mons Rumker.**

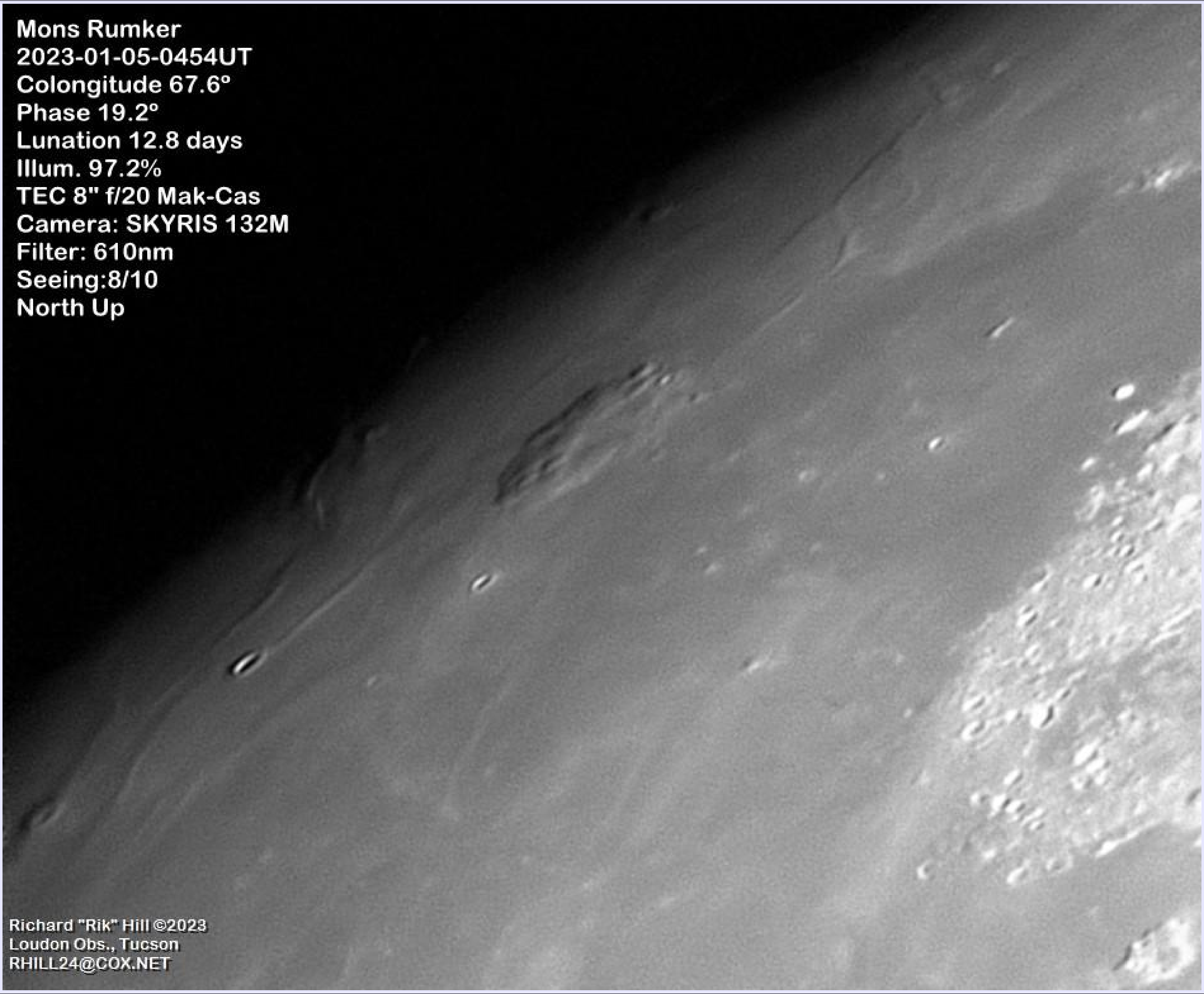



**Image and text by Rik Hill. Details of time/date and equipment as shown.**

Here we have one of the more peculiar of features on the moon located in the north of Oceanus Procellarum. Looking like a blob of cheese that has dripped off of a hot pizza, it's actually several dozen blobs of solidified lava some with summit pits or craters, rather than the proverbial green cheese. The elevation of these domes (similar to shield volcanoes on the Earth) is only 1100m near the middle of the mass has a diameter of some 70 km (or 70,000m). A gentle rise indeed! As you can see here, the very highest portion is just south of centre with a couple more local rises south of that. China's Change-5 mission landed very near Mons Rumker on Dec. 1, 2020 and returned 1.73g of samples from Procellarum on Dec. 16.

You can see this feature when the moon is but one or two days short of full depending on libration. I would urge you to put Mons Rumker on your Lunar Bucket list!

This image was made from one 1800 frame AVI stacked with AVIStack2 (IDL) and then finish processed with GIMP and IrfanView.

**Alphonsus and Arzachel.**

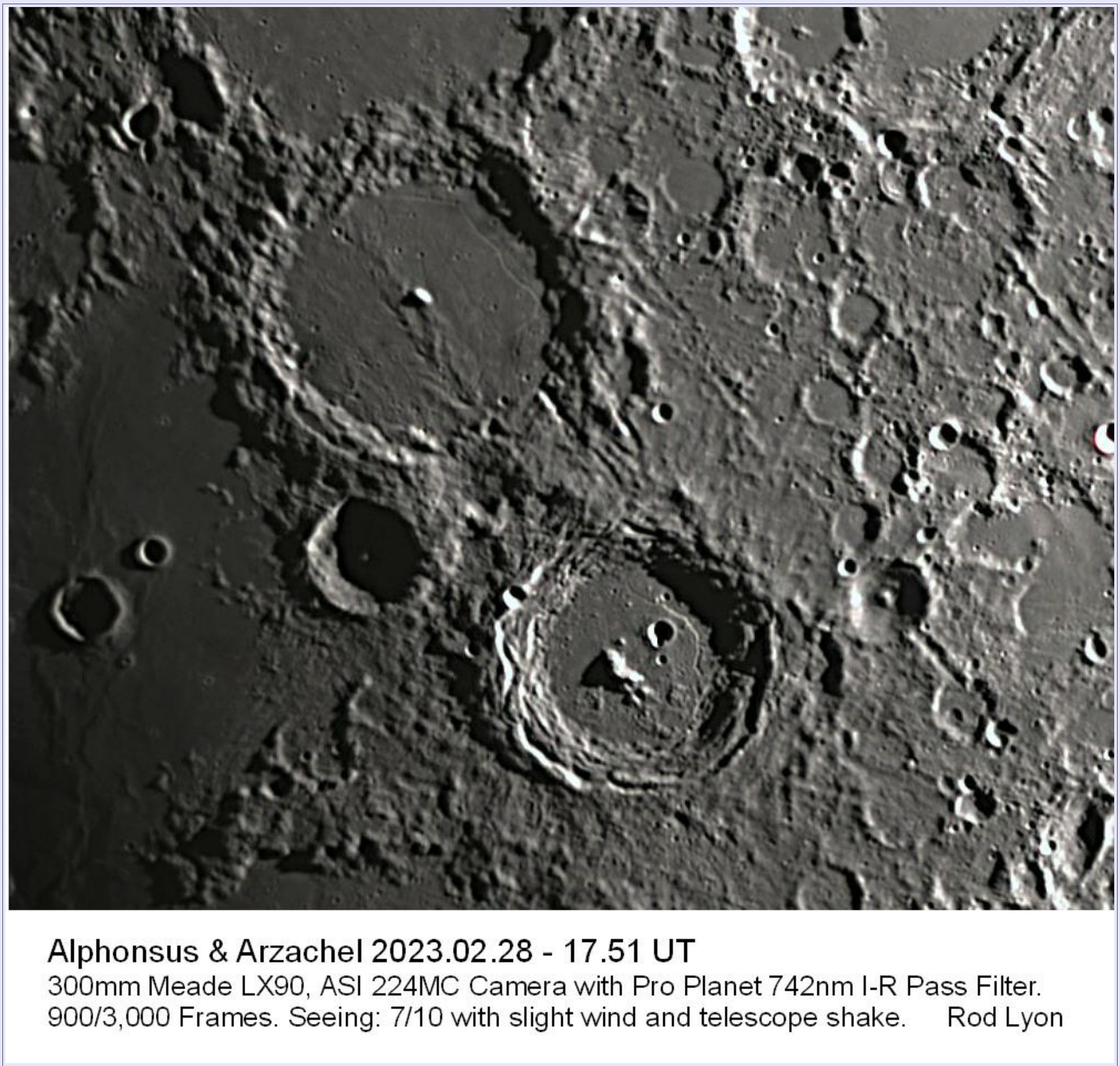



**Image by Rod Lyon with details of time/date and equipment as shown.**

**Ed. Notes.** I had never really noticed Alpetragius X, the 31km diameter ghost crater just to the west of Alpetragius, but this image shows it clearly. It is picked out by a discontinuous circle of small hills, all that remains of the highland rim of the original crater. The crater interior has been flooded with high titanium basalts from mare Nubium and appears relatively featureless, but it actually harbours two possible small volcanic structures, but don't rush out to the observatory just yet – they are very small!

Fig.1 below is a Quickmap image of Alpetragius X with the position of these two 'domes' marked with a yellow circle, and Fig.2 is a pair of NAC images showing them in detail. As can be seen they are both circular in outline, about the same size at just a shade over 1km in diameter and a dizzying 30 to 50m high. They do not appear to be the isolated summits of submerged highland material as they do not show any plagioclase signal in the mineral date overlays, and appear more or less indistinguishable from the background basalt lavas occupying the interior of the crater. In fact apart from their topography there is little to indicate that they are of volcanic origin, apart from the presence of possible vents, each about 100m in diameter visible on their summits and hints of a lava flow type deposit associated with one of them and discussed below. Their similarity might suggest a common origin, but this is not certain.

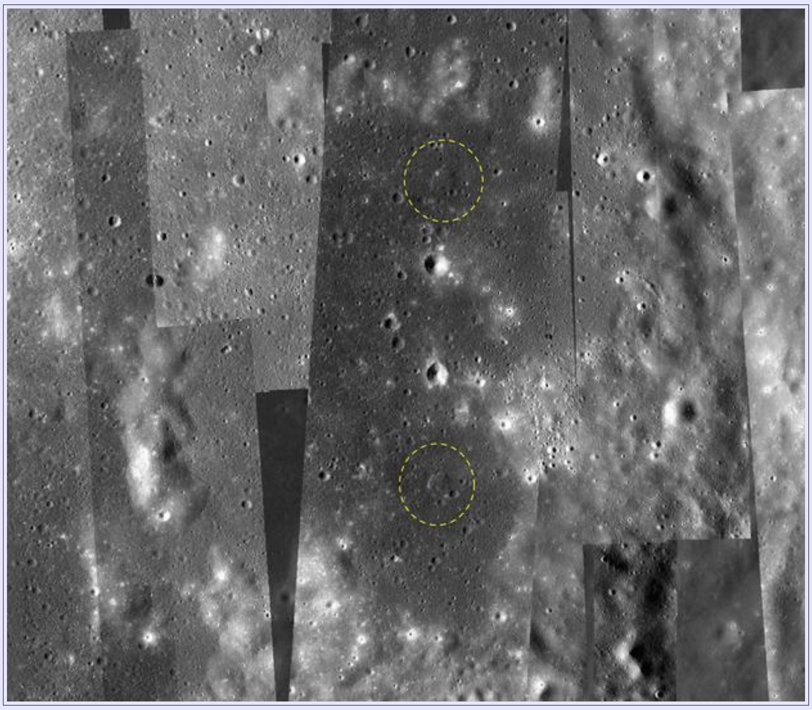


Fig.1 A Quickmap image of  Alpetragius X showing two possible domes within the dashed yellow circles.

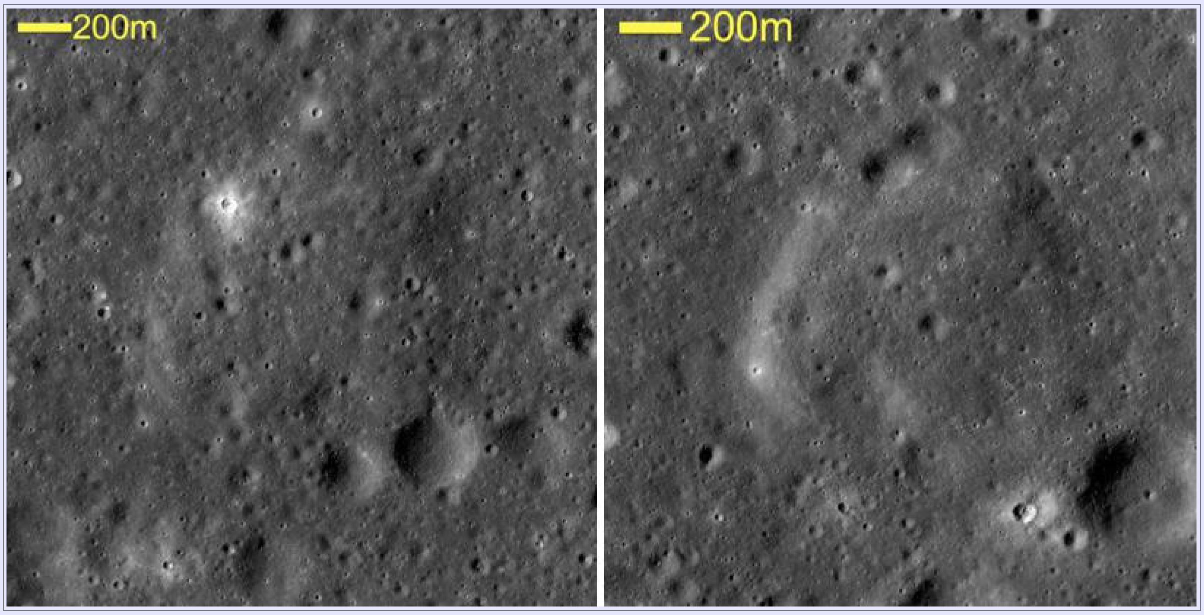
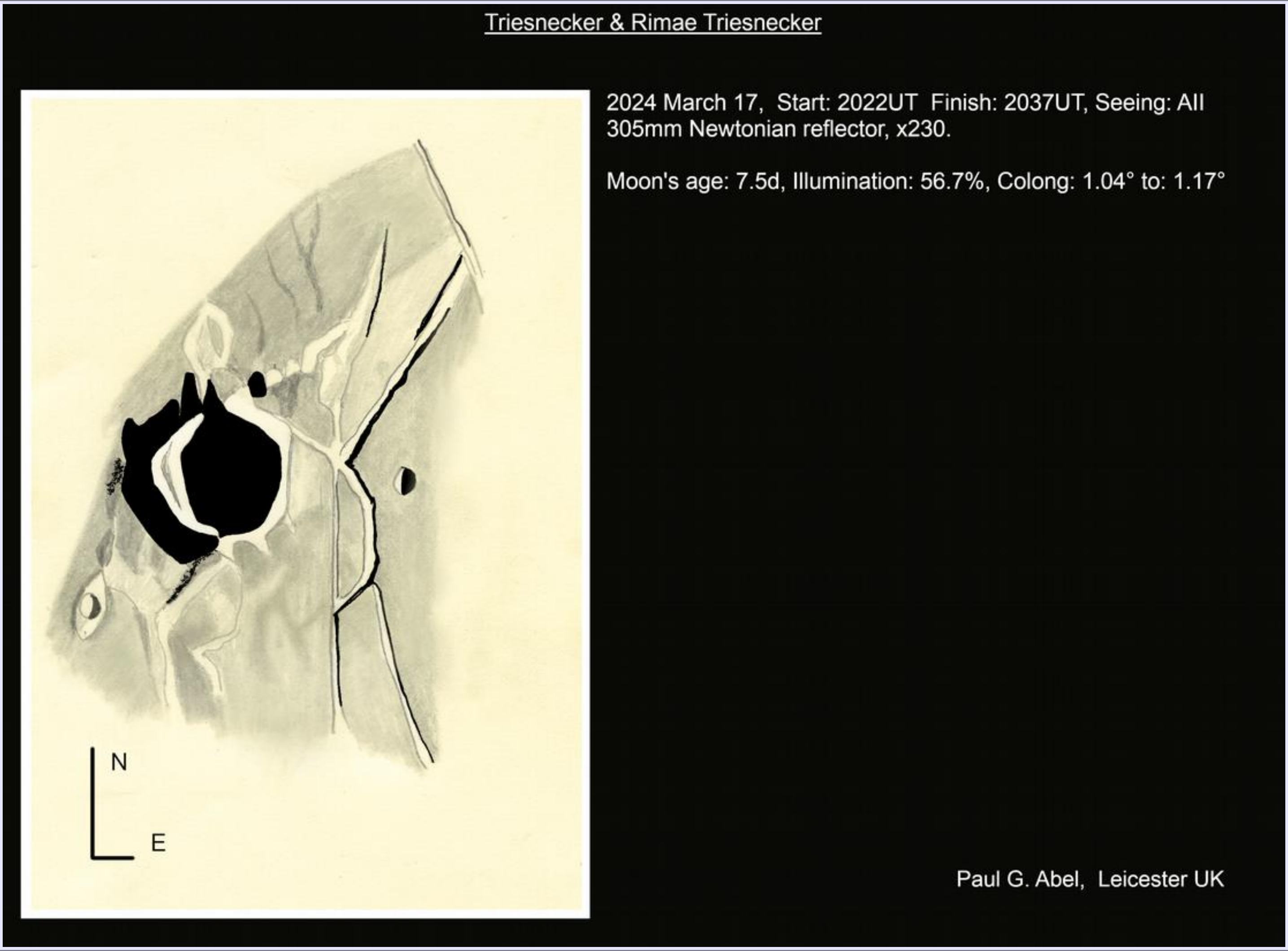



Fig.2 Details of the two possible domes from Fig.1.

So, are these small 'domes' and if so what might they represent? The southernmost one (right frame Fig.2) has what may be a thin lava flow extending away for about 2.5kms from the north western edge. It is of a lower albedo than the surrounding terrain and in places appears to have flowed over the rims of small craters along its margin – if this is the case it appears to have erupted from the 'dome' which is therefore likely to be a small effusive volcanoe of some form as opposed to simple 'bulges' in the lava surface. Most effusive structures are a bit more prominent than these two, so their small size are quite unusual.

**Rima Triesnecker.**




**Drawing and Observing notes below by Paul Abel.**

*Triesnecker Crater & Rimae Triesnecker*

*2024 March 17, 2022UT to 2037UT. 305mm Newtonian Reflector, x230, Seeing : AII*

*The sky cleared and the seeing conditions were very good. Near to the terminator was Triesnecker crater and the associated rille system Rima Triesnecker. The rille system really was magnificent, and in the good seeing looked like it had been finely engraved into the lunar surface. The system is quite extensive and covers some 200km in length.*

*Triesnecker crater was very brilliant tonight- indeed it seemed the almost glow with the glow extending into the crater- this must just be a contrast effect. Also shown in the drawing are two satellite craters, F to the east and H to the south west.*

**Agatharchides.**

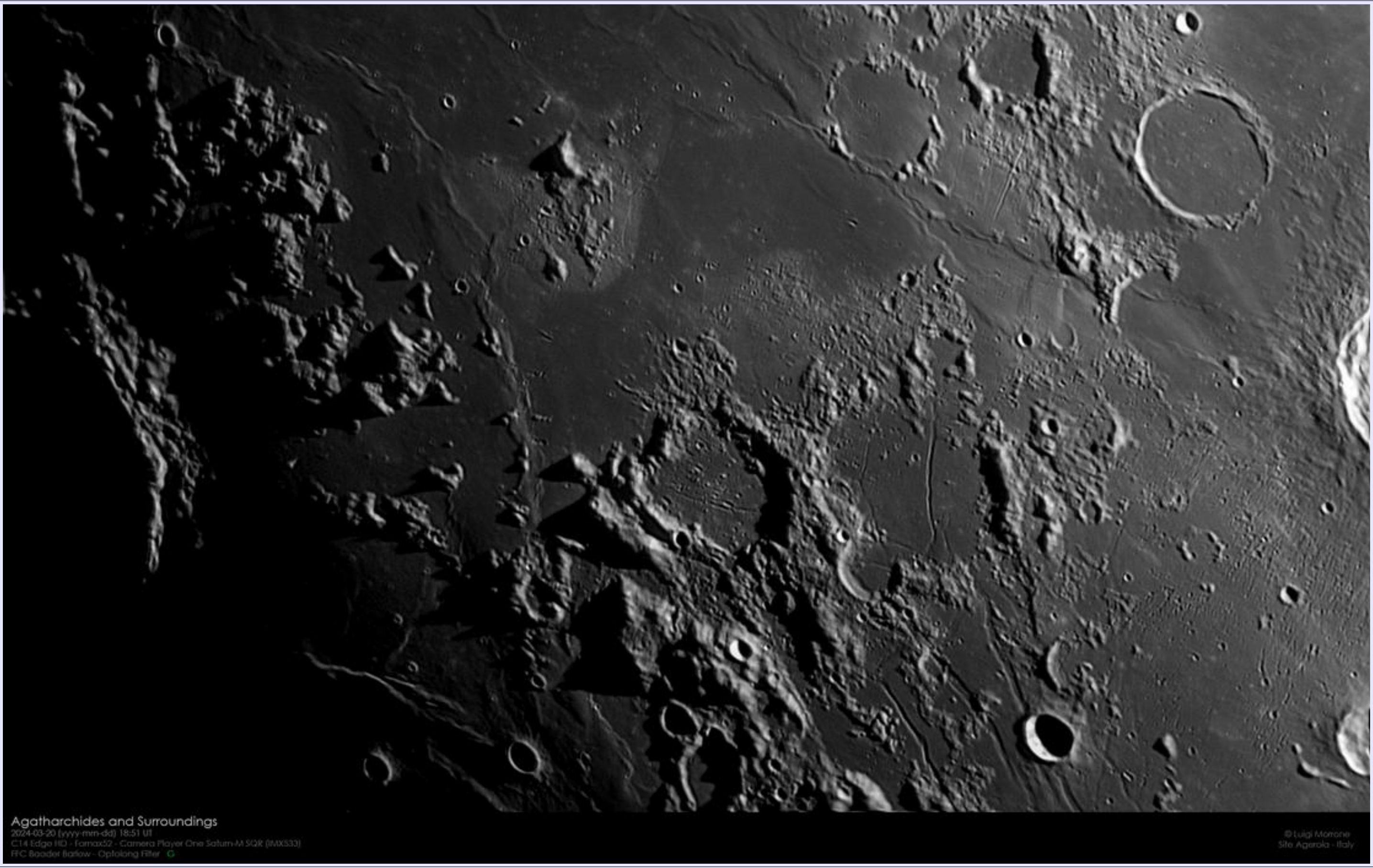


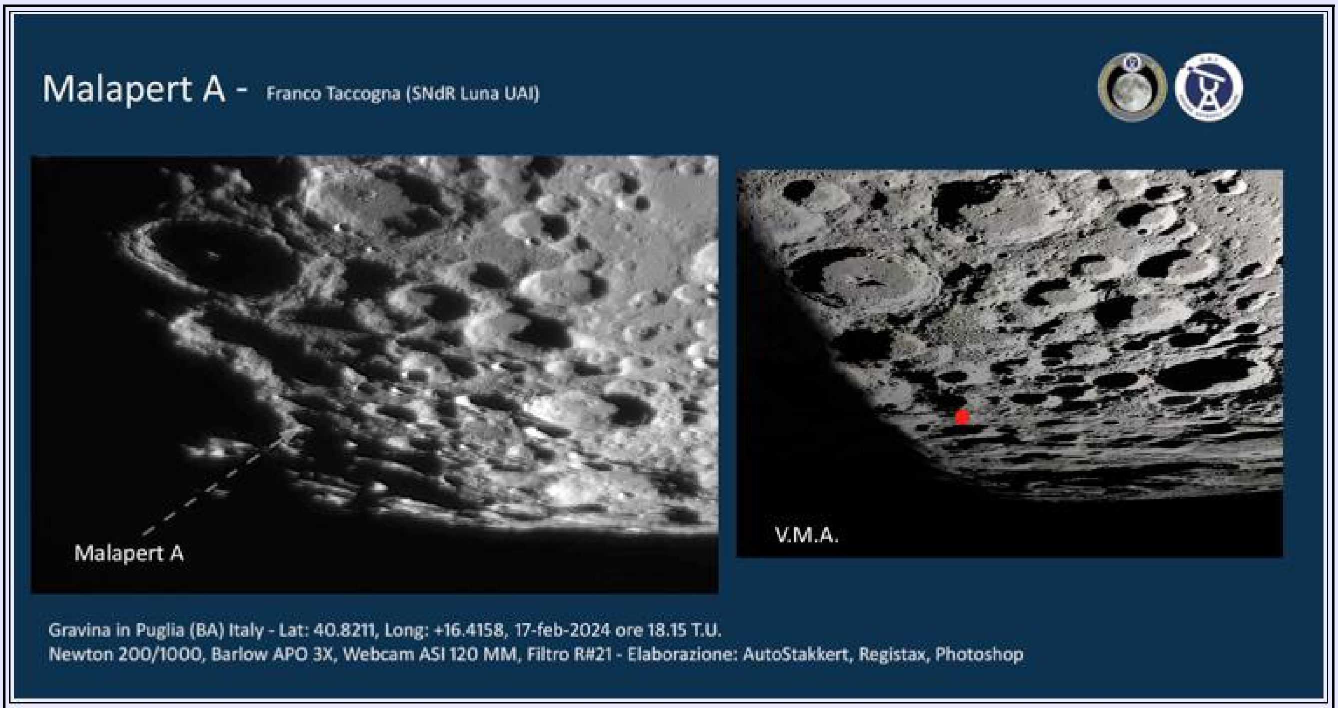

**Image by Luigi Morone and taken on 20th March 2024 at 18:51UT using a Celestron C14 Edge HD, Fornax52 – Player One Saturn M SQR (IMX533) FFC, Baader Barlow, Optalong Filter.**

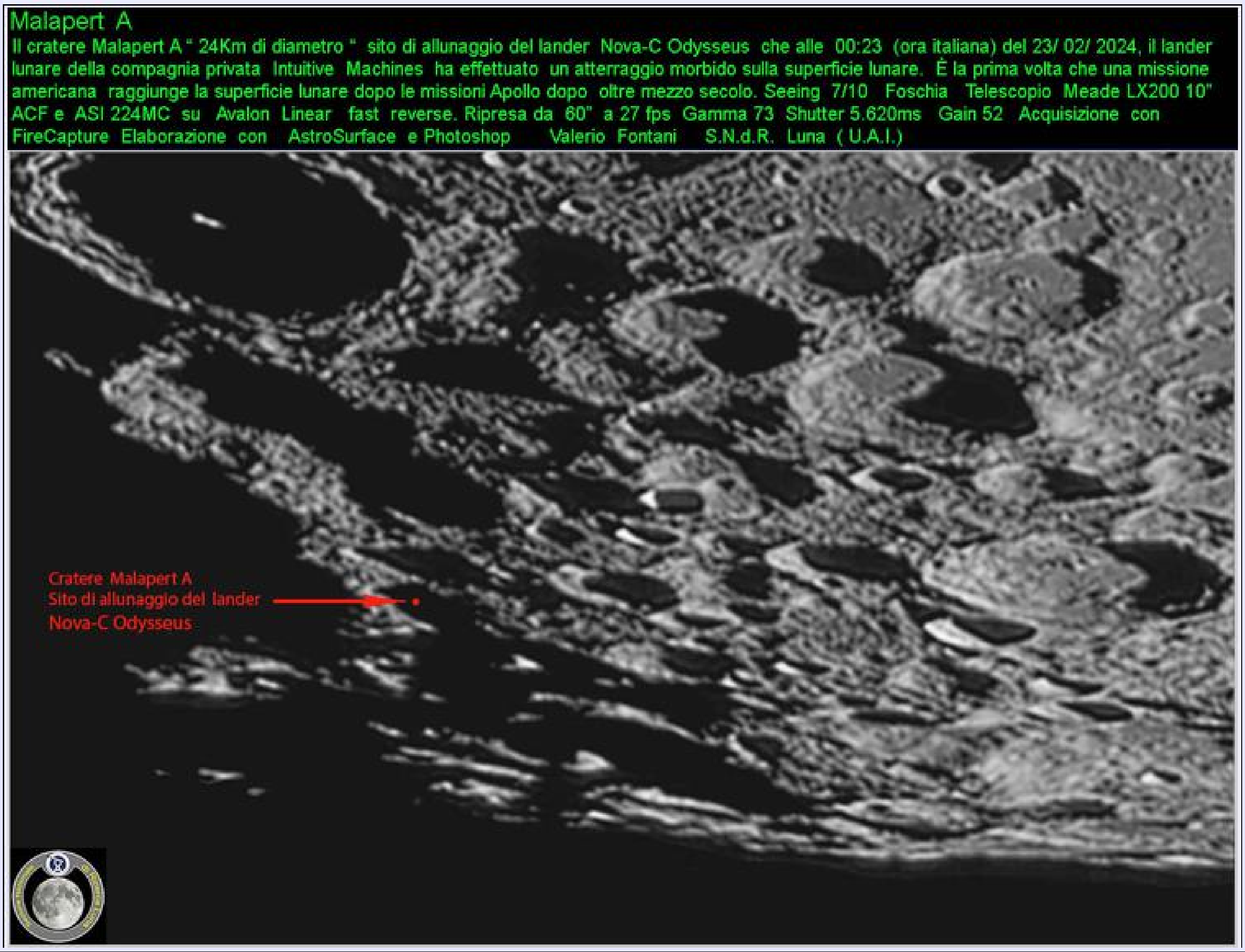
**Ed. Notes:** The prominent Rima Agatharchides crossing the floor of the flooded crater Agatharchides P (just to right of middle frame and slightly larger than Agatharchides itself, which is immediately to the west) is another one of those *graben* with a complicated floor similar to what we saw in Rima Hesiodus earlier. In places it has a double ditch running down either side whilst in other places these features are absent. Whether this is the result of volcanism produced by an ascending dike or some process associated with complex faulting is unclear but the absence of any suggestion of uplift along the length of the *graben* would suggest that faulting is more likely.

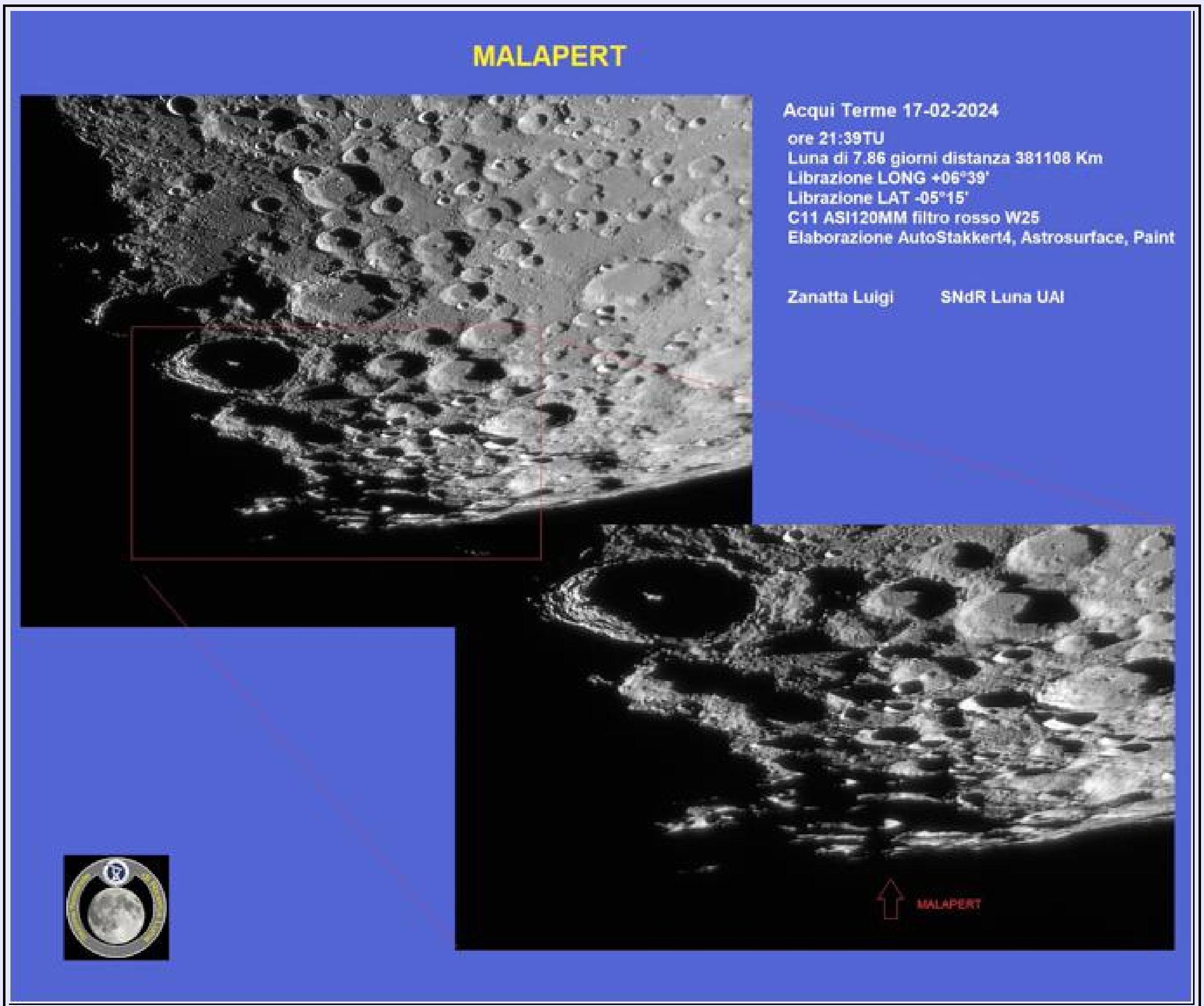
The *graben* visible in Agatharchides and Agatharchides P appear to be unconnected Rimae Hippalus which are all concentric to the Humorum Basin. The northern part of Rimae Hippalus III (the easternmost of the group) does however appear to change tack from being concentric and parallel to Rimae Hippalus II to veering off slightly towards the NE – possibly as a result of the faults responsible for Rima III coming under the influence of the more ancient fault swarm responsible for the Rima Agatharchides and which appear to trend more N-S.

## Images of Malpert A.

A series of images sent by Franco Taccogna and taken by members of the Lunar Section Research of Unione Astrofili Italiani (UAI). Franco commented: *I noticed that in the March BAA circular you published a photo of Malaper A regarding the Odysseus moon landing. Also in the UAI Moon Section we photographed the appearance of the moon landing area on 17 and 21 February. I attached some photos.*




MALAPERT
Acqui Terme 17-02-2024
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Luna di 7.86 giorni distanza 381108 Km
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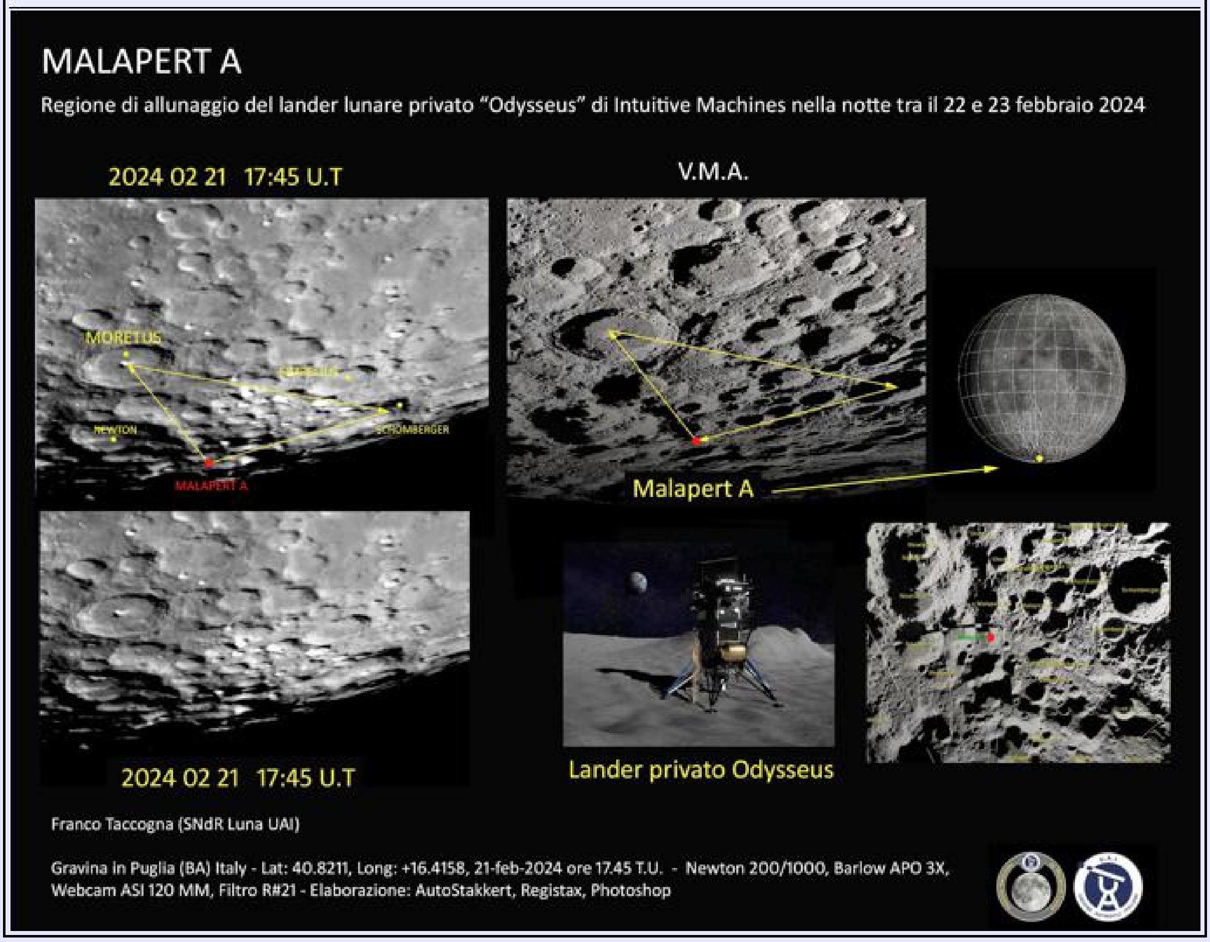
C11 ASI120MM filtro rosso W25
Elaborazione AutoStakkert4, Astrosurface, Paint
Zanatta Luigi
SNdR Luna UAI
MALAPERT


MALAPERT A
Regione di allunaggio del lander lunare privato "Odysseus" di Intuitive Machines nella notte tra il 22 e 23 febbraio 2024
2024 02 21 17:45 U.T
V.M.A.
MORETUS
NEWTON
SCHOMBERGER
MALAPERT A
Malapert A
2024 02 21 17:45 U.T
Lander privato Odysseus
Franco Taccogna (SNdR Luna UAI)
Gravina in Puglia (BA) Italy - Lat: 40.8211, Long: +16.4158, 21-feb-2024 ore 17.45 T.U. - Newton 200/1000, Barlow APO 3X,
Webcam ASI 120 MM, Filtro R#21 - Elaborazione: AutoStakkert, Registax, Photoshop

**Basin and Buried Crater Project by Tony Cook.**

It has been a few months since the last article, but I felt, after seeing the amazing lunar sunset over Rupes Recta image by Leo Aerts (Fig 1), I just wanted to highlight several possible buried craters that jump out. Note I am not saying that these are "definitely" all craters, as some maybe ring dikes or chance circularity from overlapping wrinkle ridges, but nevertheless they are all circular structures that need investigating.

The message I want to get across is that you too can also discover buried craters by taking very low sun incidence angle images of the sunrise and sunset terminators.

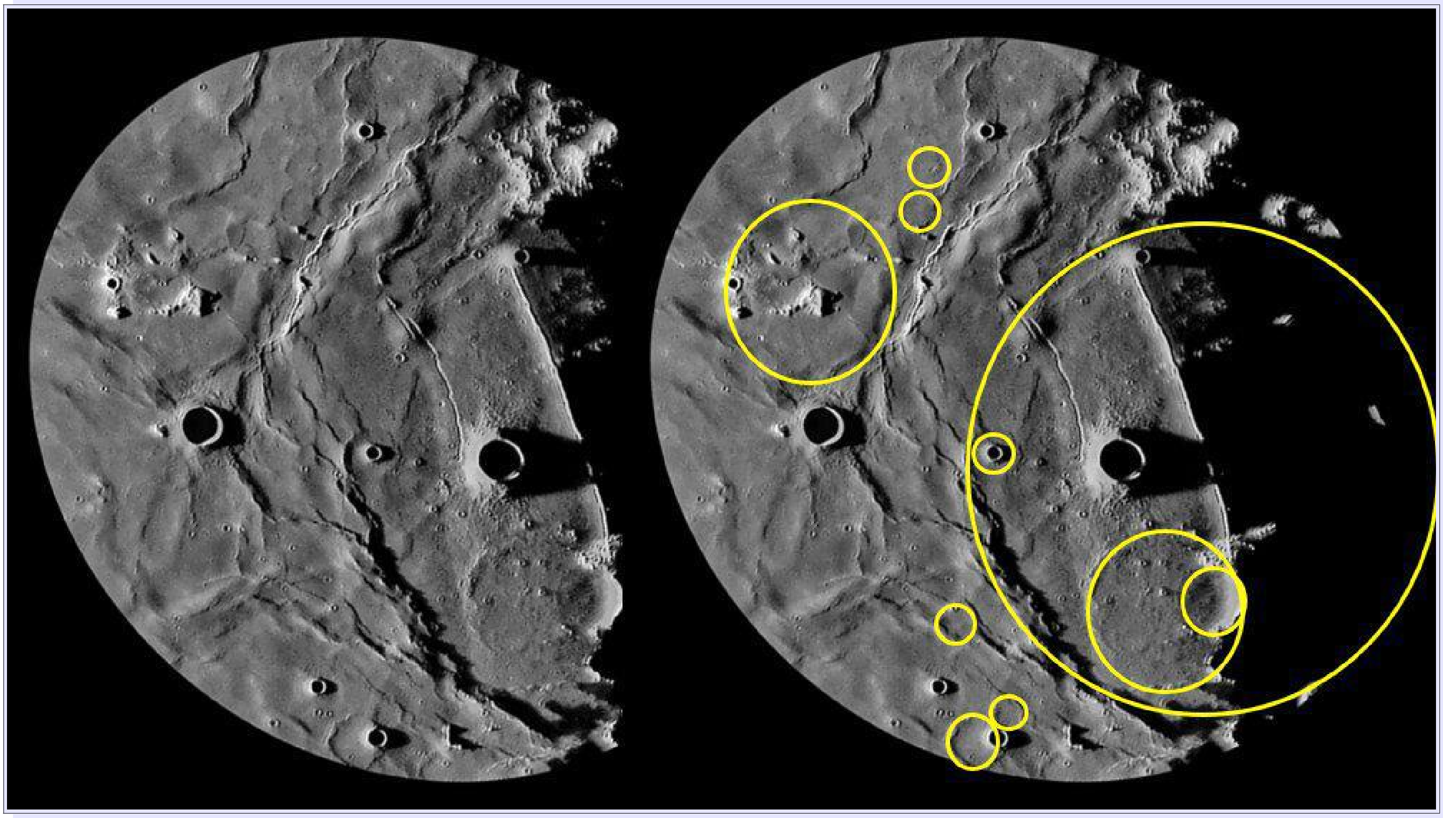


**Figure1** The Rupes Recta area as imaged by Leo Aerts on 2019 Nov 20 and orientated with north towards the top. **(Left)** the original image. **(Right)** Image with candidate buried craters added.

If you think that you have discovered a new impact basin, or unknown buried crater, please check whether it has been found previously on the following web site, and if not email me its location and diameter so that I can update the list.

https://users.aber.ac.uk/atc/basin_and_buried_crater_project.htm.

Alternatively, if you want an observational challenge, try to see if you can image one of more of the basins or buried craters at sunrise/set and establish what colongitude range they are best depicted at. Or you can even do this "virtually" with LTVT software. As you can see from the tables on the web sites there are lot of blank cells to fill in on the sunrise and sunset colongitude columns – so a good opportunity for you to get busy!

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## Lunar domes (part LXXIX): Archytas G dome by Raffaello Lena

Mare Frigoris is located just north of Mare Imbrium, and stretches east to north of Mare Serenitatis. Basalts in mare Frigoris are particular in that they occur in an area that is not clearly related to any unambiguously accepted impact structure. Mare Frigoris may be part of the large and very old Procellarum basin, but the existence of this basin is still disputed. The basin material surrounding the mare is of the Lower Imbrian epoch, while the eastern mare material is of the Upper Imbrian epoch and the western mare material is of the Eratosthenian epoch (Lucchitta, 1978). Lucchita (1978) suggested that the concentration of Eratosthenian and Imbrian eruptions in Mare Frigoris, Imbrium, and Oceanus Procellarum is due to a thin lithosphere beneath the putative Procellarum basin. The basalt fill within Mare Frigoris is thick (greater than 400 m) and was emplaced in at least three major episodes within topographic lows overlying a thick lunar lithosphere (Whitford-Stark, 1983 and references therein). The oldest identifiable unit is dominated by titanium-poor lavas and was succeeded by basalts of intermediate and titanium-rich composition.

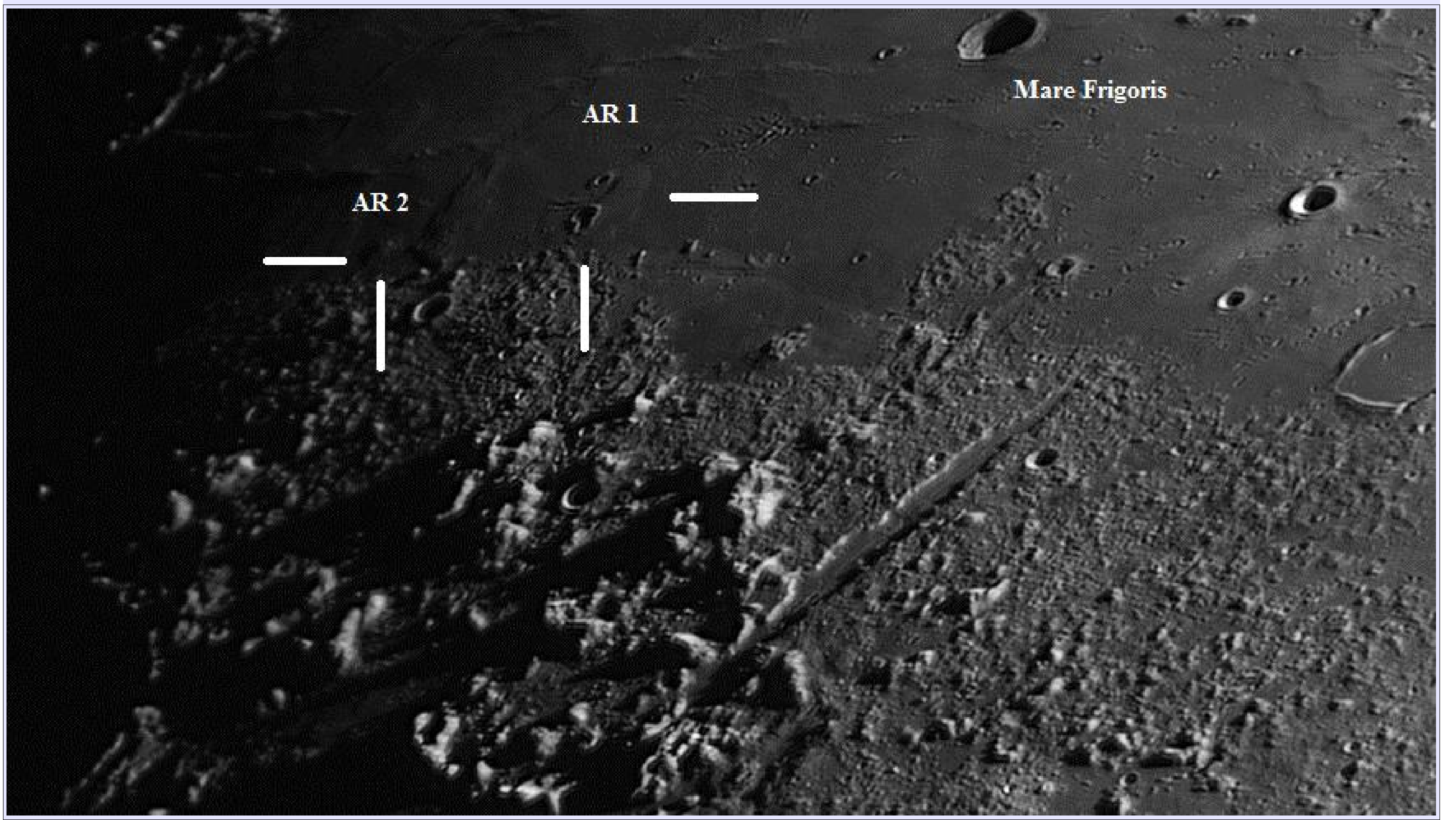


**Figure 1**: Vallis Alpis and Mare Frigoris including the domes Archytas 1 and 2 (AR1 and AR2). Image taken on February 17 2024 by Vincenzo della Vecchia, Cassegrain 30 cm f/20.

The lavas appear to have been emplaced largely by flood-style eruptions. Whitford-Stark (1983) suggested that the topographic low of western Frigoris was probably created by the collapse of highland blocks into the Imbrium impact cavity. The line of separation may have been an Imbrium ring fracture or a ring fracture of the older Procellarum basin.

Parts of Frigoris have been mapped by Ulrich (1969), Lucchitta (1972), and M'Gonigle and Schleicher (1972), and a geologic map of the entire mare has been made by Lucchitta (1978). The volcanic tectonic evolution of Mare Frigoris was extensively examined by Whitford-Stark (1990). He provided a geologic map of the mare basalt units where red units indicate titanium-poor basalts and blue units, titanium-rich. Additionally the western basalts are correlated with the Sharp *formation* of Oceanus Procellarum and the reddish basalts with the *Telemann formation* of Procellarum (Whitford-Stark and Head, 1980). Multispectral imagery only provide compositional data relating to the upper soil layer rather than the bedrock since the Mare Frigoris is extensively covered by rays from highland craters and from large craters within the mare, e.g. Harpalus and Aristoteles (cfr. Whitford-Stark, 1990 and references therein). The extent to which these spectra are representative of the underlying basalt is dependent upon the amount of highland material mixed with the locally derived soil.

Furthermore in Mare Frigoris a concentric crater, Archytas G, is situated. Concentric crater are small crater containing an inner ring about 1/2 the diameter of the main crater.

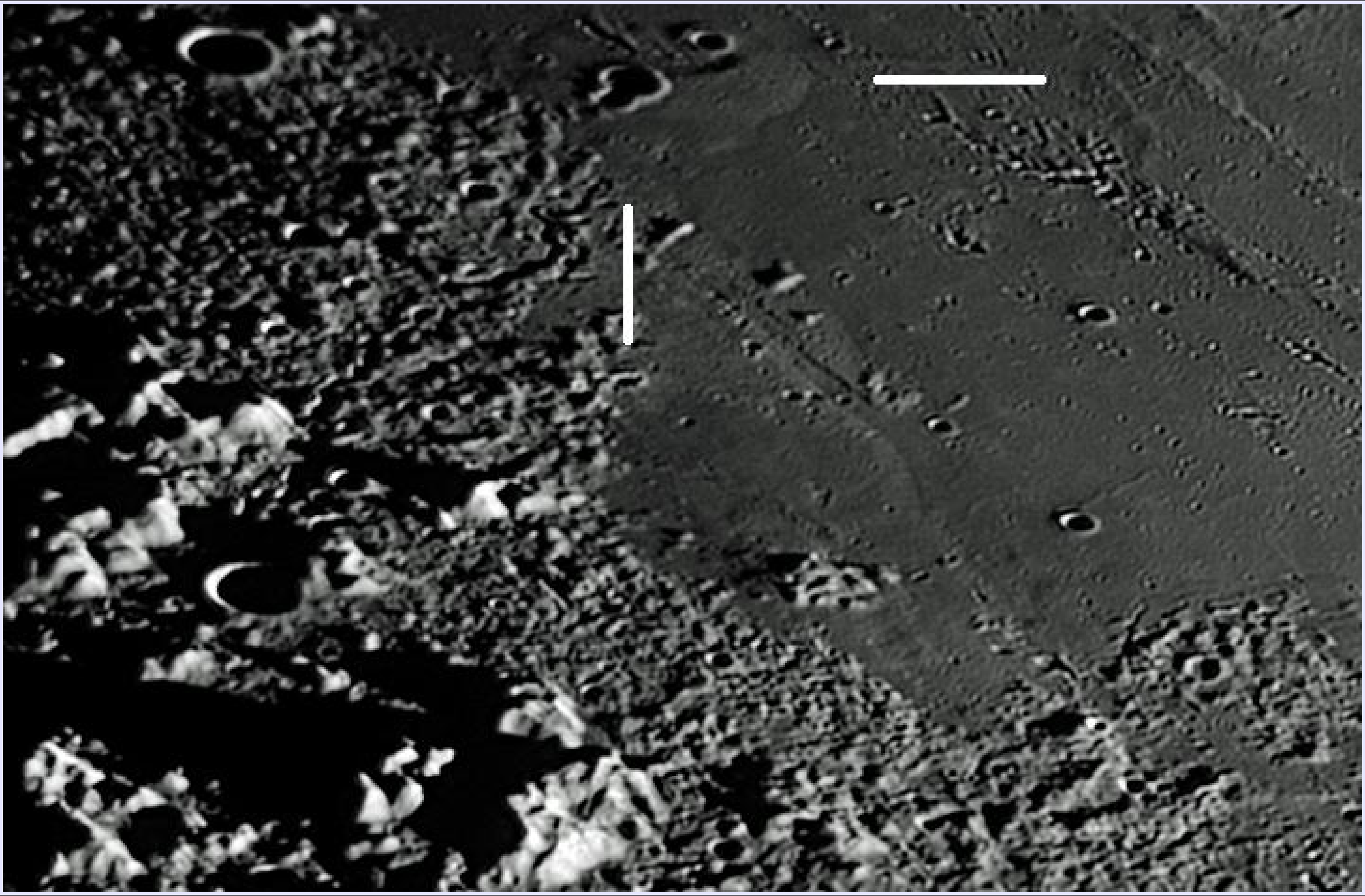

**Figure 2**: Mare Frigoris including the dome Archytas 1. Image taken on February 17 2024 at 18:04 UT by Luigi Morrone, C14 telescope (Schmidt Cassegrain 355 mm f/11).

Wood (1978) has examined the morphology and distribution of 51 concentric craters. Morphologies of the inner rings vary from donut like, rounded ridges to steep crater rims to flattened mounds. Some 70% of concentric craters are located near the margins of maria and on the adjacent highlands. They are not found in the central region of maria. Wood (1978) argues that the concentration of concentric craters near mare margins suggests an association with volcanism and possible association with basin related fractures. However one theory suggests that concentric craters are normal impact craters that developed an inner ring because the impact occurred on a layered surface (usually on thin mare lava), with the outer rim formed by interaction with the mare and the inner by interaction with the sub-mare layer. A second theory argues that the inner ring forms by some sort of volcanic eruption (Wood, 1978).

The concentric crater Archytas G is situated on raised lava platform fwith an evident rille-like feature, traversing the surface. It is a cluster or chain of small craters. M'Gonigle and Schleicher (1972) outline evidence of secondary craters and their ejecta excavated by impacts of larger Eratosthenian craters. To the south west another straight rille is situated. In the examined region, the ALPO catalogue and the revised list of lunar domes (Kapral and Garfinkle, 2005) report two domes. The first dome described as “double dome” is reported at coordinates of 1.22º E and 55.80º N, with a dimension of 17 km. From our old images we have argued that this dome is a larger shallow structure including the concentric crater Archytas G. Moreover we have identified another dome, of 11 km in diameter, which does not correspond in dimension (2 km) and position to the previously reported object termed “Plato 4” (Kapral and Garfinkle, 2005).

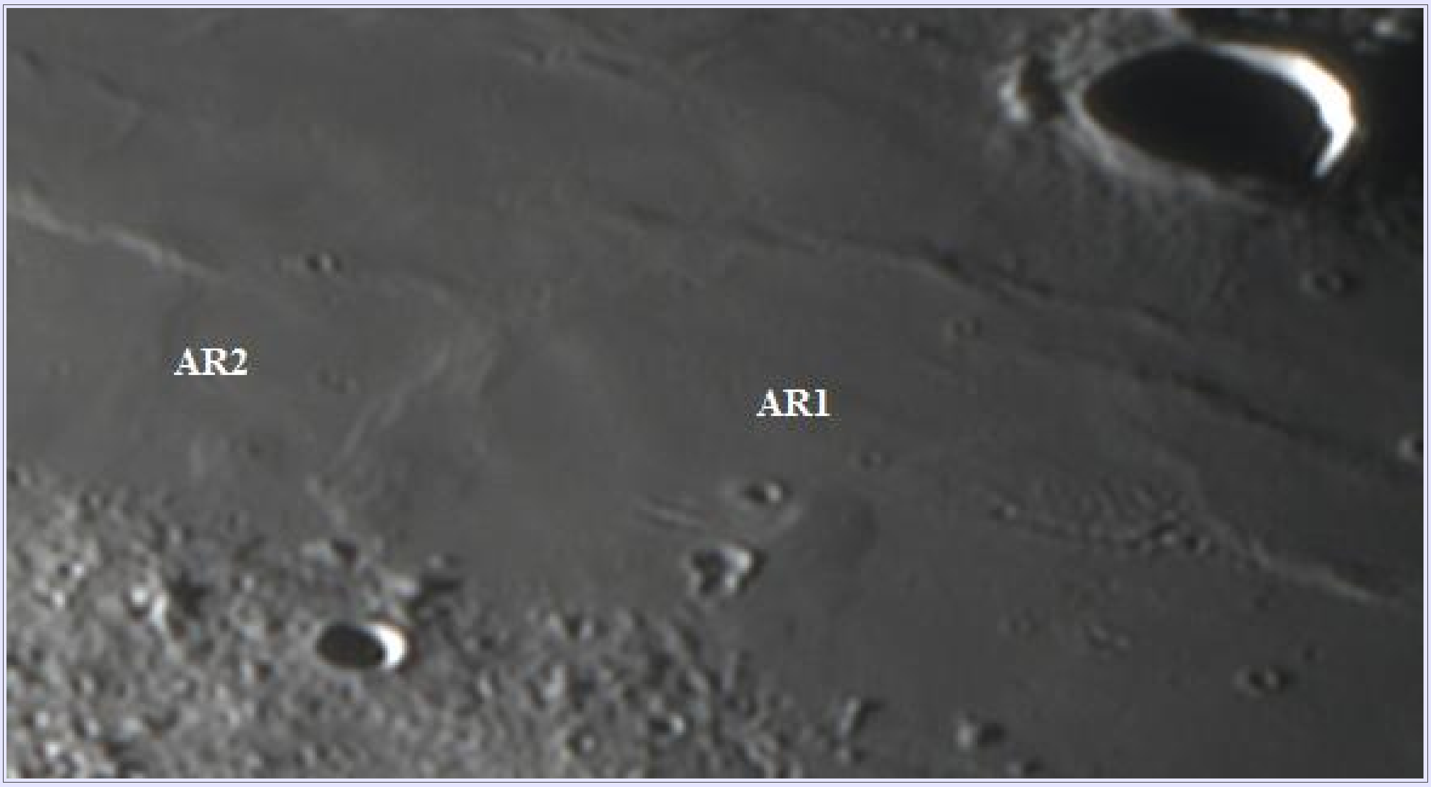


**Figure 3**: Mare Frigoris including the domes Archytas 1 and 2 (AR1 and AR2). Image taken on February 12 2023 at 01:47 UT by Massimo Dionisi Newton 250mm telescope.

In this note I will examine the first dome AR1, based on our previous published data (Wöhler and Lena, 2009 https://www.lpi.usra.edu/meetings/lpsc2009/pdf/1091.pdf)

Dome Archytas 1 (Figs. 1-3) requires a specific solar altitude to be observed clearly. Interestingly, the concentric crater Archytas G appears to be situated on the summit of the domical structure. We suggested that this dome includes the concentric crater.

Using our available images, the diameter of Archytas 1 (considered as single dome) amounts to 33 km ± 1 km. The northern part of the dome is traversed by a rille which is composed of multiple craterlets instead of being continuous (Fig. 4).

Our interpretation is that the rille is a cluster or chain of secondary craters. Another straight rille is situated on the southern part of its surface. It ends where the dome reaches the mare surface. Our interpretation is that this straight rille is due to tensional stresses, indicating structural control by subsurface geology. Furthermore, the dark feature detectable near the centre of Archytas 1 just north of the concentric crater is interpreted as a fault extending in north-south direction. Several examples of faults located in the surface of mare-traversing low swells of intrusive nature appear on the Moon. The presence of the fault on the surface of Archytas 1 suggests that the uplift resulted from the rise of magma that did not erupt onto the surface, producing a vertical rupture of the surface.

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## Lunar Geological Change Detection Programme

**Are These Real TLP?**

Images of two potential TLP have been received, both concerning Aristarchus and blueness.

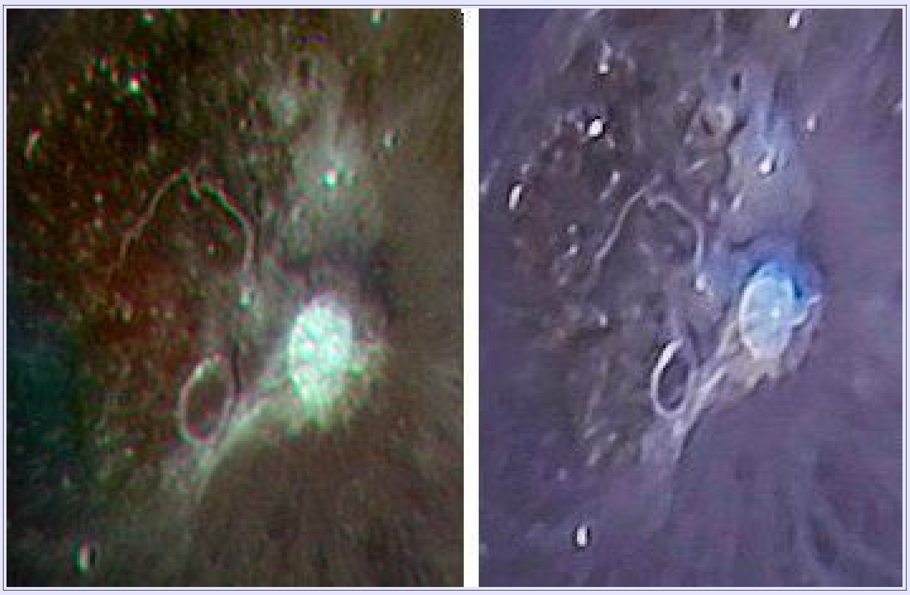

**Figure 1.** Aristarchus orientated with north towards the top. **(Left)** An image by Brendan Shaw (BAA) taken on 2003 Dec 07 UT 23:42 with colour saturation increased. **(Right)** An image by Andy Conway taken on 2024 Feb 23 UT 19:22 with colour saturation increased. Processed with Autostakkart - best 10% of the images selected for stacking and wavelets applied.

**Aristarchus 2024 Feb 23 UT 19:22**: An email was received from Andy Conway (Glasgow?, UK). Andy was using an 8" Stella Lyra Newtonian (Dobsonian mount) with a 9mm Plossl eyepiece, a Samsung A33 phone was mounted at the eyepiece and 36 sec of video was obtained. Seeing was average to good. It is not surprising to see natural mauve colour on the north ejecta blanket of Aristarchus and a tinge of red on the south, but what is slightly strange is the blueness hugging the north rim (See Fig 1 - Right). You can compare this with another colour image taken back in 2003, by Brendan Shaw, under similar illumination. Colour balancing is tricky to perform precisely but the take home point is that Brendan's image shows no blueness hugging the northern rim of the crater. Now there could be a number of possibilities to explain the blueness: 1) Chromatic aberration or atmospheric spectral dispersion seems unlikely as this does not show up on other features, though if you look at Fig 2 (left) there is a hint of blueness in approximately same location and maybe redness on the southern rim? 2) internal reflection in the optics is also unlikely as the video was taken with the lunar surface drifting across and internal reflection largely stays in the same place. 3) Image processing artefacts are a possibility as the phone image was compressed and the wavelet processing may have caused "ringing" effects on the contrasty edge of Aristarchus's northern rim. I think for now I will apply an ALPO/BAA weight of 2.

**Aristarchus 2024 Mar 23 UT 22:08**: Two images were taken by a relatively new observer to submit observations to us from the AEA group in Argentina, Gonzalo Vega, and forwarded to me by Walter Elias. They were taken through a 20cm f/5 Newtonian Eq5 GoTo scope. Both images show no blueness on the northern rim (Fig 2 - Centre and Right), but instead blueness between the west rim of Aristarchus and the north east of Herodotus. Furthermore, two cameras were used and the blueness appears in the same place. According to Walter Elias, no follow up images were taken. Walter himself took some colour images of the crater on the same night at 23:06 and 23:18UT but the lower resolution and data compression made colour analysis difficult and there was certainly no sign of blueness.

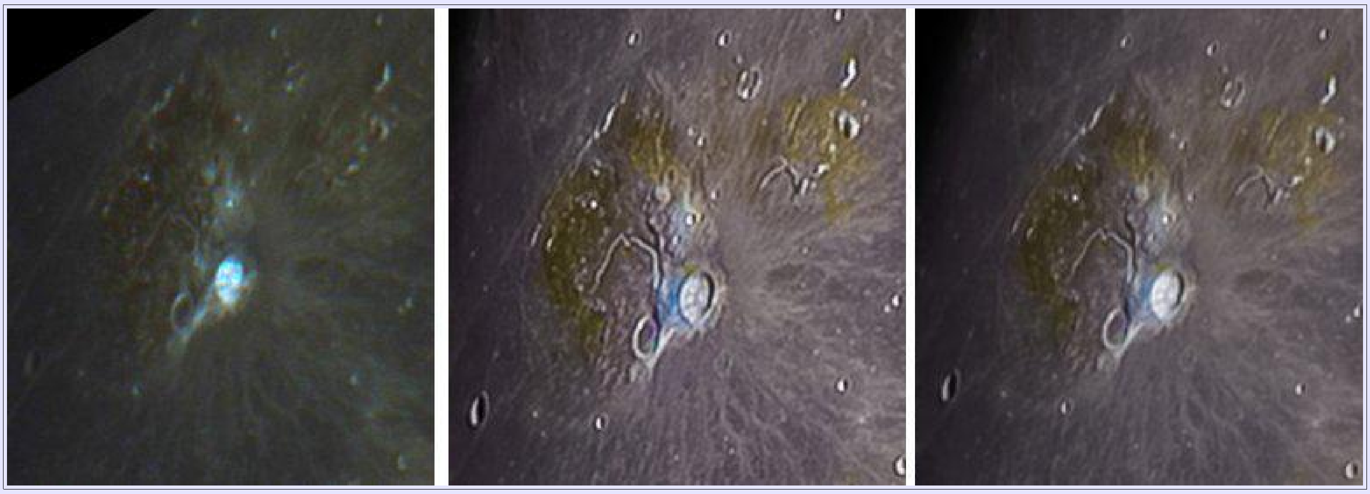

**Figure 2.** Aristarchus orientated with north towards the top. **(Left)** An image by Franco Taccogna (UAI) taken on 2012 Oct 28 UT 19:33 with colour saturation increased. **(Centre)** An image by Gonzalo Vega (AEA) taken on 2024 Mar 23 UT 22:08 with a Player One Ceres C camera – presumably with colour saturation increased? **(Right)** An image by Gonzalo Vega (AEA) taken on 2024 Mar 23 UT 22:08 with a Nikon D5100 camera – presumably with colour saturation increased?

So either some blue TLP event occurred an hour earlier and had vanished by the time Walter observed, or Walter's image quality was not sufficient. We do of course have past, similar illumination colour images, and one of these Fig 2 (Left), taken by UAI observer Franco Tacogna, shows no sign whatsoever of blue between Aristarchus and Herodotus – instead blueness inside Aristarchus, which is what I would normally expect it. The fact that the images supplied to us by Gonzalo Vega, both show blueness in the same location, despite being taken with different cameras with the crater located at different positions in the image, helps to rule out chromatic aberration and internal lens flare. Atmospheric spectral dispersion is another possibility and would be present in the same locations in both images – however this is more prominent on extreme contrast edges, which the location between Herodotus and Aristarchus is not! A colour processing artefact might be a possibility but note that this should enhance the blueness of the interior of Aristarchus (see Fig 2 – Left), but we cannot see that in the two images that Gonzalo presents us with. In view of the fact that two different cameras were used, and there is no strong natural colour here – I will give this report an ALPO/BAA weight of 3 – but obviously would have liked to have seen a time sequence or at least another colour image taken by another observer at that time from somewhere else in the world.

So as to whether these two reports are of TLP I would be interested to hear your thoughts? But anyway please check to see if you were imaging the Moon on these nights, or if you know of other astronomers who might have been. This would then put us in a much better position at proving, or disproving, these reports of colour in the images submitted.

**Routine reports received for January included**: Paul Abel (Leicester, UK – BAA) observed: Hansen and Rima Ariadaeus. Leo Aerts (Belgium – BAA) imaged: Albategnius, Aliacensis, Alphonsus, Archimedes, Aristillus, Arzachel, Cassini, Deslandres, Maginus, Mare Insularum, Mons Mouton, Montes Apenninus, Moretus, Palus Petredinis, Pitatus, Plato, Ptolemaeus, Rima Hyginus, Rupes Recta, Schroter, Several Features, Stofler, Triesnecker, Tycho, Vallis Alpes and Walter. John Axtell (UK – BAA) imaged: Mare Nectaris. Massimo Alessandro Bianchi (Italy – UAI) imaged: several features. Maurice Collins (New Zealand - ALPO/BAA/RASNZ) imaged: several features. Liz Daly (Mid Wales, UK – NAS) imaged several features. James Dawson and Richard Severn (Nottingham, UK – BAA) imaged: Rupes Recta. Walter Elias (Argentina – AEA) imaged: Aristarchus and Herodotus. David Finnigan (UK – BAA) imaged: Bailly, Klaproth and Lagrange. Valerio Fontani (Italy – UAI) imaged: Fra Mauro. Les Fry (Mid-West Wales, UK – NAS) imaged: Aristotles, Cyrillus, Gemma Frisius, Mare Serenitatis, Maurolycus, N. Pole, Posidonius, Promontorium Archerusia, Rima Ariadaeus, Rupes Altai, S. Pole and Theophilus. Massimo Giuntoli (Italy – BAA) observed: Cavendish E. Bill Leatherbarrow (Sheffield, UK – BAA) imaged: Aristoteles, Cassini, Palus Putredinis, Ptolemaeus, Stofler, Triesnecker, Vallis Alpes, W Bond and Walther. Chris Longthorn (UK – BAA) imaged: Albategnius, Aristarchus, Fracastorius, Rima Hyginus, Theophilus, Triesnecker and several features. Trevor Smith (Codnor, UK – BAA) observed: Apianus D, Aristarchus, Maurolycus and Ptolemaeus. Franco Taccogna (Italy – UAI) imaged: Aristarchus, Herodotus, Lansberg and several features. Aldo Tonon (Italy – UAI) imaged: Fra Mauro, Herodotus, Lansberg, and several features. Alexander Vandenbohede (Belgium – BAA) imaged: Bode, Boussingault, Cyrillus, Guericke and Moretus. Luigi Zanatta (Italy – UAI) imaged: earthshine, Fra Mauro and Lansberg.

Note that I have included many observations submitted to the BAA Lunar Section pool here, just in case some were taken by chance during a repeat illumination session.

**Analysis of Routine Reports Received (January) – Continued from the last newsletter:**

**Mare Crisium:** On 2024 Jan 15 UT 18:06 Chris Longthorn (UK – BAA) imaged this area under the same illumination conditions to the following report:

***North shore of Mare Crisium 1915 Dec 11 UT 06:00? Observed by Thomas (Glenorchy, Tasmania) "star-like pt. on N. shore of mare. (Eimmart?) Particularly bright spot. Tho't it was sunlight from rim of sm. crater." NASA catalog weight=0 NASA catalog ID #358. ALPO/BAA weight=1.***

**Figure 3.** A colour saturation enhanced image of Mare Crisium, orientated with north towards the top. Taken on 2024 Jan 15 UT 18:06 by Chris Longthorn (BAA).

The bright star like point on the northern shore of Mare Crisium (See Fig 3) is not Eimmart, just a sunward facing slope with a bright ray crater on top. Mission accomplished with figuring out what this was, and it crops up in other past TLP reports that have been eliminated. We shall remove this individual TLP report from the catalog by assigning an ALPO/BAA weight of 0.

**Ptolemaeus:** On 2024 Jan 18 UT 17:20-17:35 Trevor Smith (BAA) conducted a visual observation of this crater for the following lunar schedule request:

***BAA Request: Examine the floor visually, sketch, or image to show the progression of the shadow spires across floor. If observing visually, how would you describe the appearance of the central lit area on the floor? If imaging, do a time lapse e.g. 1 image per minute to show the progression of the shadow spires. We are asking for these observations following an observation by N. Travnok***

***(Brazil) on 2020 Jul 27 UT 23:00 who commented on an unusual appearance to the floor. It would be really useful to have visual observing of the appearance and please note down what the seeing conditions are like. If you want to image it at high resolution, please go ahead but remember that any image stacking should not be from sections of video of longer than 1 min duration as the shadows change in length rather quickly at sunrise. Any sketches, visual descriptions, or images taken, should be emailed to: a t c @ a b e r . a c. u k***

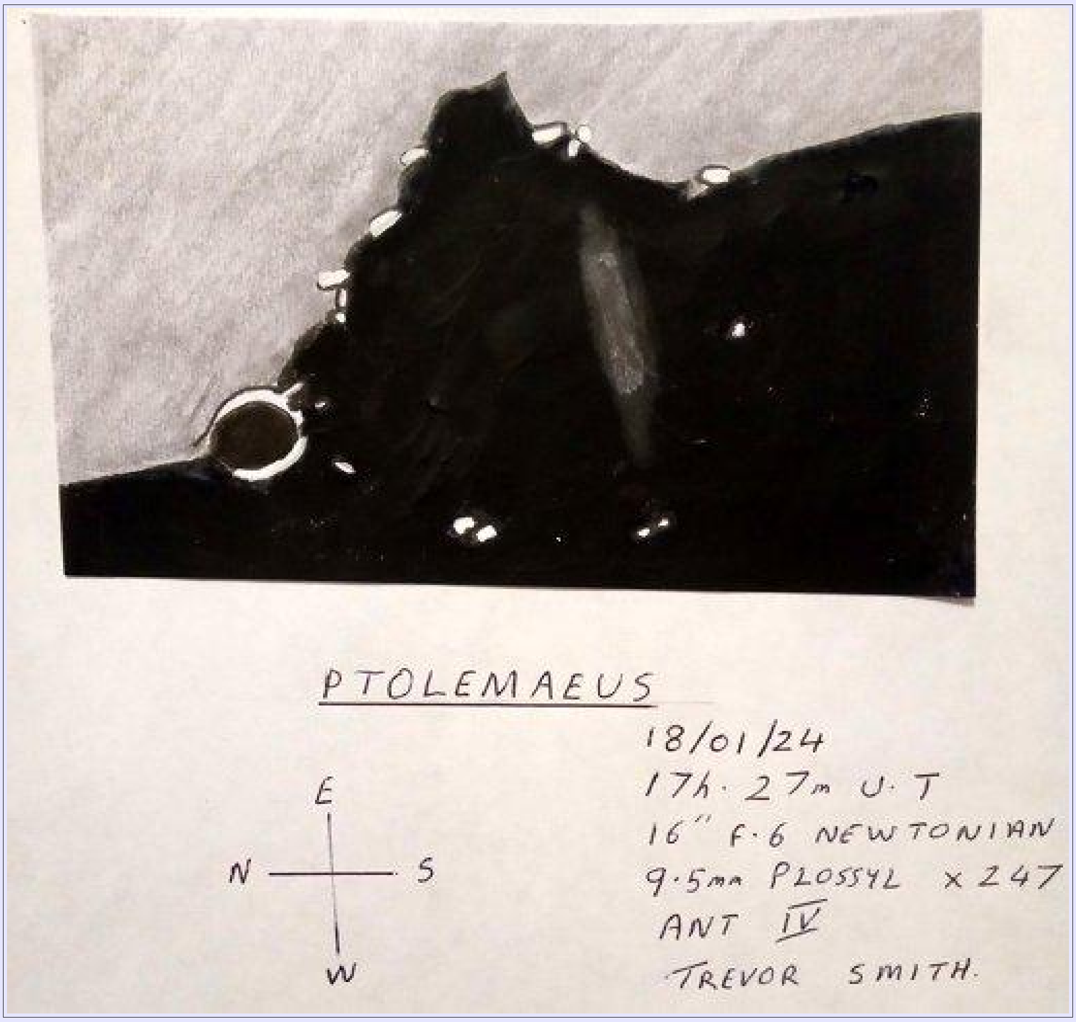


**Figure 4.** A sketch of Ptolemaeus crater made by Trevor Smith (BAA) for the date and UT given on the sketch. The north direction is also indicated.

At 17:20UT Trevor noticed a brightening on the southern floor – resembling a faint linear greyish smudge – and although not bright, it was obvious once he had noticed it. Trevor comments that he had to make it brighter in Fig 4 to be seen but in reality was dimmer than this. He had been observing earlier in the evening (before 17:17 after which he got temporarily clouded out) but had not noticed it. Trevor wonders if it was produced by light scattering off the ramparts. Unfortunately he was finally clouded out at 17:35 and so could not watch its development,

**Plato:** On 2024 Jan 19 UT 17:45 Leo Aerts (BAA) imaged this crater under similar illumination to the following report:

***Plato 1789 Jul 30 UT 21:00? Observed by Schroter (Lilienthal, Germany) NASA Catalog Event #61, NASA Weight=2. Event described as: "Soon after sunrise saw a kind of fermentation on the floor which clearly resembled a kind of twilight, (due to some kind of aberration unknown to the observer?)" For further details see reference: Middlehurst, B.M., Burley, J.M., Moore, P.A. and Welther, B.L., 1968, NASA TR R-277. ALPO/BAA weight=2.***

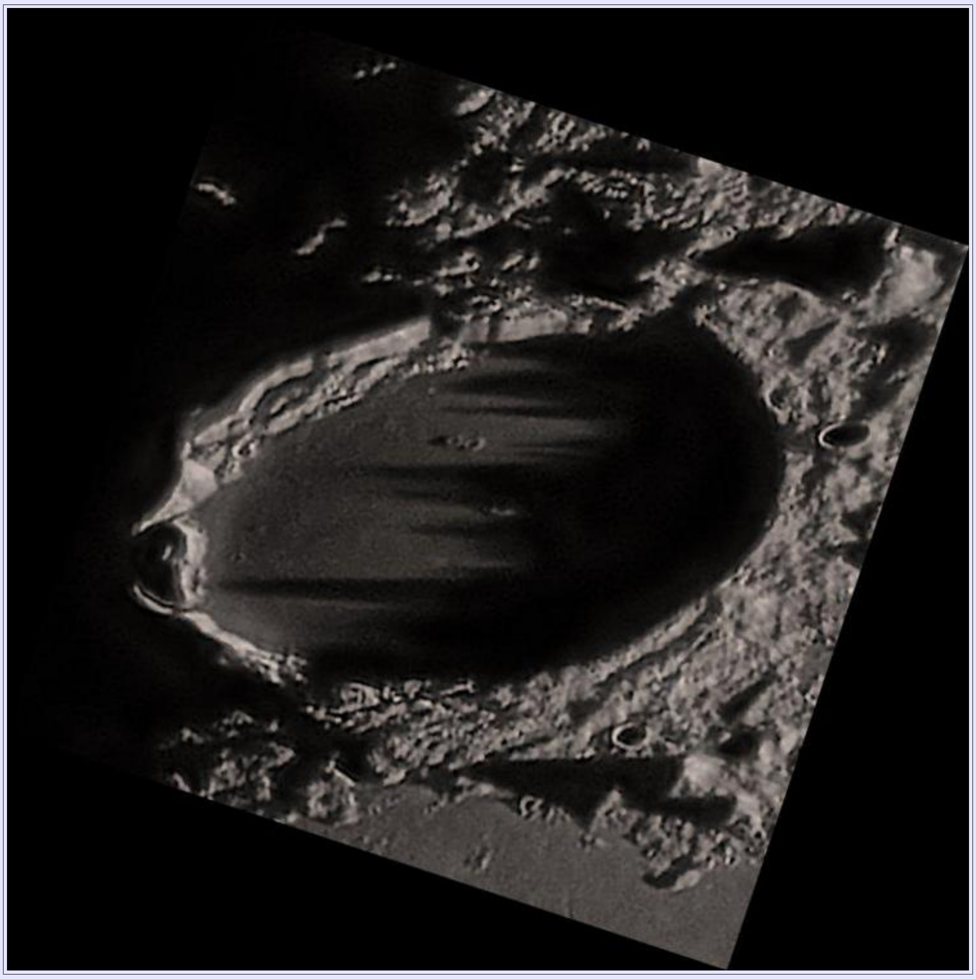

**Figure 5.** Plato as imaged by Leo Aert (BAA) on 2023 Jan 19 UT 17:45.

One of the drawbacks of the repeat illumination predictions is that the tolerance is ±0.5˚ for sub-solar longitude and sub-solar latitude, and at lunar sunrise this can have a big impact on the length of the shadows. On the other-hand if we had finer tolerance of say is ±0.05˚ then the chances of having any repeat predictions would be most unlikely. Considering Cameron has an estimated UT of 21:00 for the 1789 report, Leo's image is probably the best we can hope for and is certainly not short of resolution. Perhaps the "fermentation" that Schroter described is the effect of atmospheric seeing on very fine detail of the needle-like coming into and going out of focus? We shall leave the weight of this report at 2 for now.

**Alphonsus:** On 2024 Jan 19 UT 18:11 James Dawson and Richard Severn (BAA) imaged the Rupes Recta region which just happened contain the southern part of Alphonsus, under similar illumination to the following report below. Likewise at 18:20UT Alexander Vandenbohede (BAA) also took an image which contained part of Alphonsus under similar illumination:

***Alphonsus 1952 Nov 25 UT 17:15 A.P. Lenham (Swindon, UK, 3-inch refractor) noted that the usual dark spots were not visible. This may not be a TLP but has been given a TLP category as it is a curious appearance and needs to be verified on a repeat illumination appearance. ALPO/BAA weight=1.***

Although Fig 6 (Left) is only a small part of the original image that was supplied, it contains one of the dark spots on the floor of Alphonsus – so we know at this illumination dark spots should be visible and so when A.P. Lenham did not see them back in 1952, he had a reason to note this down. However, Alexander Vandenbohede took another image, some 9 minutes after Fig 6 (Left), which shows a bit more of the floor. I have done some image contrast stretching in Fig 6 (Right) as the dark spots were not very contrasty unlike at Full Moon. This would concur with A.P. Lenham having difficulty seeing them, especially if the transparency was poor. So I think I will lower the ALPO/BAA weight from 1 to 0 and remove the TLP from the database.

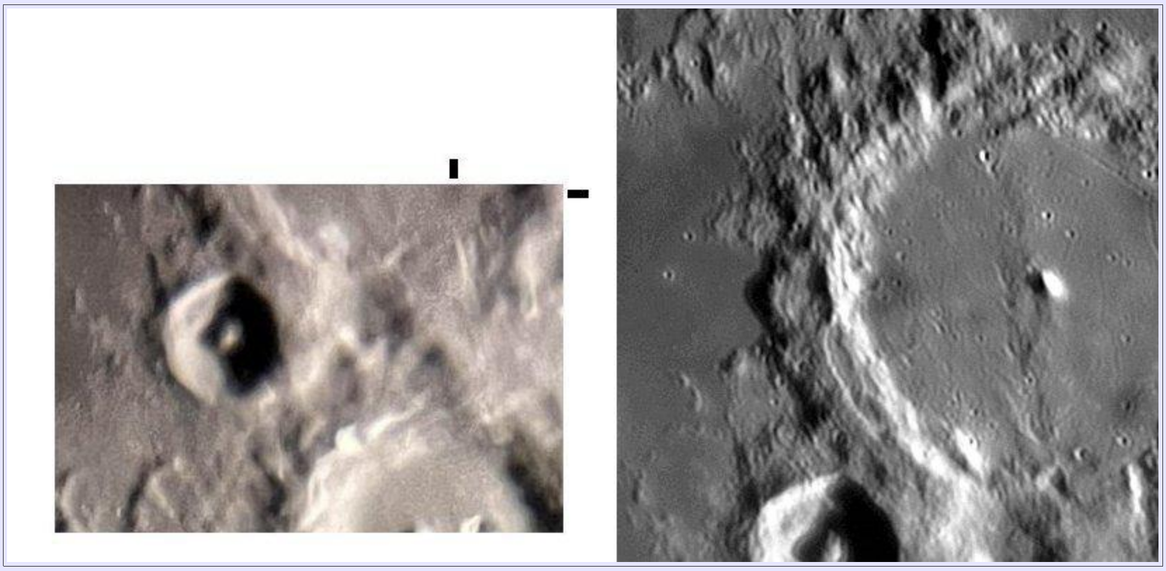

**Figure 6 (Left)** The southern part of Alphonsus, Alpetragius and the northern half of Arzachel, orientated with north towards the top. Taken from a small portion of a larger image of the Rupes Recta region, imaged by James Dawson and Richard Severn on 2024 Jan 19 UT 18:11. The tick marks point to one of the dark pyroclastic patches on the floor of Alphonsus.(Right) Increased coverage in an image by Alexander Vandenbohede (BAA) taken at 18:20 UT.

**Aristarchus:** On 2024 Jan 22 UT 18:26 Franco Taccogna (UAI) imaged this crater under similar illumination to the following report:

***On 1987 Jan 11 at UT 18:15-23:00 P. Grego (Birmingham, UK, 6" reflector, seeing=III) sketched Aristarchus crater and saw two luminous circular patches on the exterior east wall - these were less bright than the inner wall but brighter than the outer wall. The Cameron 1978 catalog ID=292 and weight=5. The ALPO/BAA weight=2.***

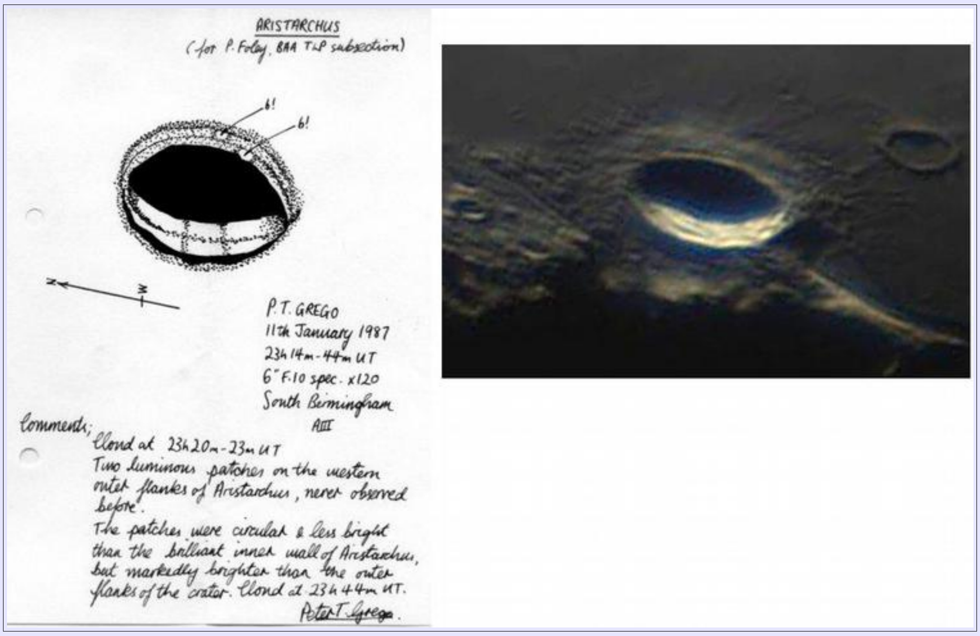


**Figure 7** Aristarchus with north towards the left. **(Left)** A sketch made by Peter Grego for the date and UT listed in the sketch. Note that the west direction is classical. Normally in IAU sense west would be towards the bottom of the sketch. **(Right)** An image by Franco Taccogna (UAI), taken on 2024 Jan 22 UT 18:26, with similar illumination and orientation to the Grego sketch.

Franco's image (Fig 7 – Right) does not show the two luminous points on the eastern outer rim, but it may just be that the predictions are only accurate to ±0.5˚ similar illumination, so maybe if the image was taken a few minutes later the sunlight might just start reaching those points. We shall leave the ALPO/BAA weight at 2 for now.

**Herodotus:** On 2024 Jan 22 UT 22:38 Aldo Tonon (UAI) imaged the crater under similar illumination to the following two reports:

***Observed by Bartlett (Baltimore, MD, USA, 5" reflector x180, S=1-5, T=5) Pseudo peak visible within floor shadow at 03:10h" NASA catalog weight=4 (high). NASA catalog ID #671. ALPO/BAA weight=3.***

***On 2002 Feb 24 UT 05:15-05:35 W. Haas (Las Cruces, NM, USA) observed an obscuration in Herodotus - the shadow was, almost, but not completely black. ALPO/BAA weight=2.***

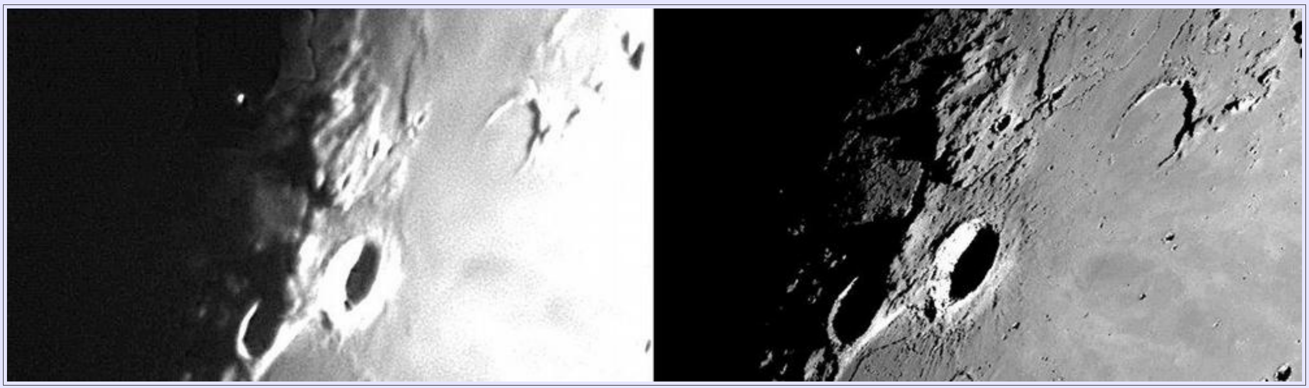

**Figure 8.** A contrast stretched version of Aristarchus and Herodotus, orientated with north towards the top. **(Left)** Image by Aldo Tonon t(UAI) aken on 2024 Jan 22 UT 22:38**. (Right)** An LTVT simulated view, generated by Aldo Tonon.

Fig 8 left shows no sign of a pseudo peak, or a greyness inside the shadow – nor does the LTVT simulation in Fig 8 right. We shall leave the weights respectively at 3 and 2.

**Herodotus:** On 2024 Jan 23 UT 02:33 Walter Elias (AEA) imaged this crater under similar illumination to the following TLP report:

***On 2016 Jun 17 UT 05:00 A.Anunziato (AEA, Argentina Meade ETX 105, seeing 7/10, sketch made) observed a very tiny light spot where the shadow from topographic relief to the south of Vallis Schroteri merges into the crater rim shadow on the floor of Herodotus. There should be no light spot here. ALPO/BAA weight=1.***

**Figure 9** Aristarchus and Herodotus as imaged by Walter Elias (AEA) on 2024 Jan 23 UT 02:33.

No sign of the light spot in the location mentioned in the 2016 report, appears in Fig 9, so we shall leave the ALPO/BAA weight at 1 for now.

**Cavendish E**: On 2024 Jan 23 UT 21:00 Massimo Giuntoli (BAA) observed visually this crater, using a 124mm refractor at x190 and found this crater to be normal in appearance. Note that sometimes this crater becomes very bright – so we are trying to find out what selenographic colongitude this happens at. Massimo comments that in the Feb LSC an image taken by Chris Longthorn, was taken at the same time that Massimo noticed the northern section of the western wall of the crater was bright as it was emerging from shadow.

**Censorinus:** On 2024 Jan 25 UT 19:21 Massimo Alessandro Bianchi imaged the whole Moon under similar illumination and similar topocentric libration to the following report:

***Near Censorinus 1964 Apr 26 UT 20:00? Observed by Hopmann (Czechoslovakia?) "Surface brightening somewhat similar to Kopal and Rackham in #779" NASA catalog weight=3. NASA catalog ID #810. ALPO/BAA weight=2.***

I am uncertain whether the Hopmann measurements of the brightness of the region near Censorinus were via photographic densitometry or by photometry. However, whichever method was used, Fig 10 is what the Moon would have looked like in terms of viewing angle and illumination to within ±1˚. Measuring the brightest pixel in the bright parts of Aristarchus, Censorinus and Proclus gives respectively: 223, 244 and 240. So if Censorinus was what was measured back in 1964 then yes it would have been one of the brightest features on the Moon and definitely brighter than the bright spot near Hell which is usually the brightest. Whether the "near Censorinus", in the description, can be treated as "Censorinus", is uncertain. We shall therefore leave the ALPO/BAA weight at 2 for now until some observational reports or publication for the 1964 event can be found and shed more light on this TLP.

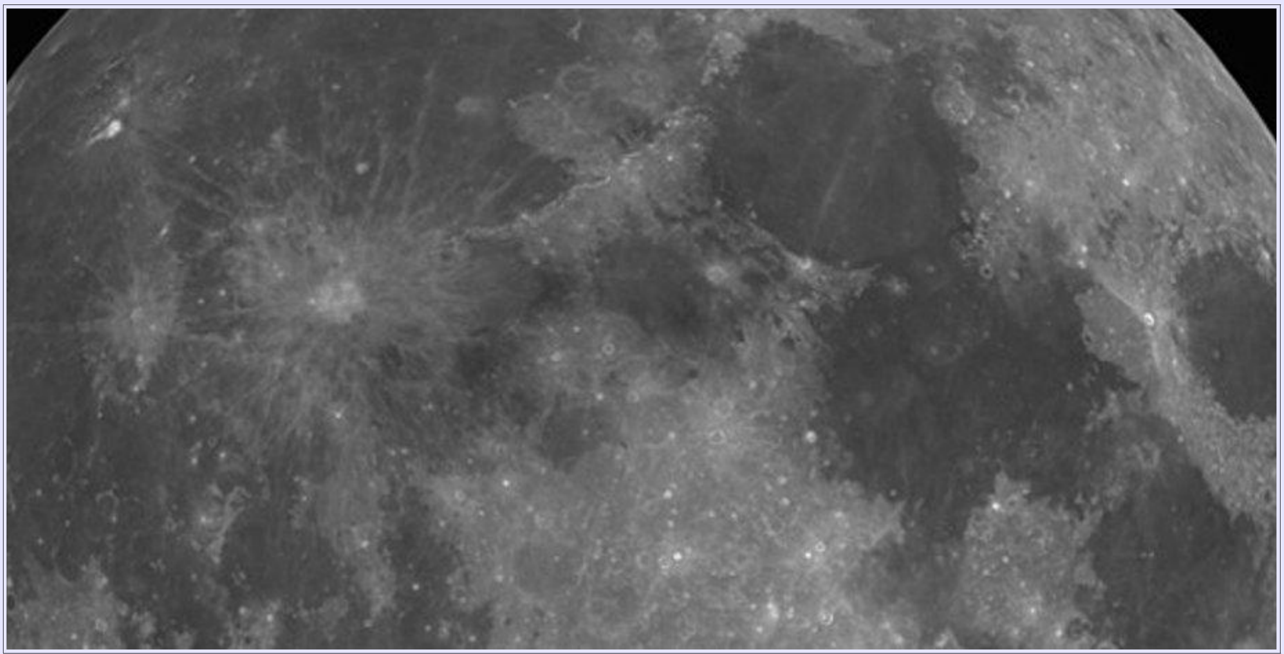

**Figure 10.** Part of the northern hemisphere of the Moon as imaged on 2024 Jan 25 UT 19:21 Massimo Alessandro Bianchi and orientated with north towards the top.

**General Information:** For repeat illumination (and a few repeat libration) observations for the coming month - these can be found on the following web site: http://users.aber.ac.uk/atc/lunar_schedule.htm . By re-observing and submitting your observations, only this way can we fully resolve past observational puzzles. If in the unlikely event you do ever see a TLP, firstly read the TLP checklist on http://users.aber.ac.uk/atc/alpo/ltp.htm , and if this does not explain what you are seeing, please give me a call on my cell phone: +44 (0)798 505 5681 and I will alert other observers. Note when telephoning from outside the UK you must not use the (0). When phoning from within the UK please do not use the +44! Twitter TLP alerts can be accessed on https://twitter.com/lunarnaut .

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**Many thanks to all contributors. Items for the May circular should reach the Director or Editor by the 20th April 2024 at the addresses show below.**

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